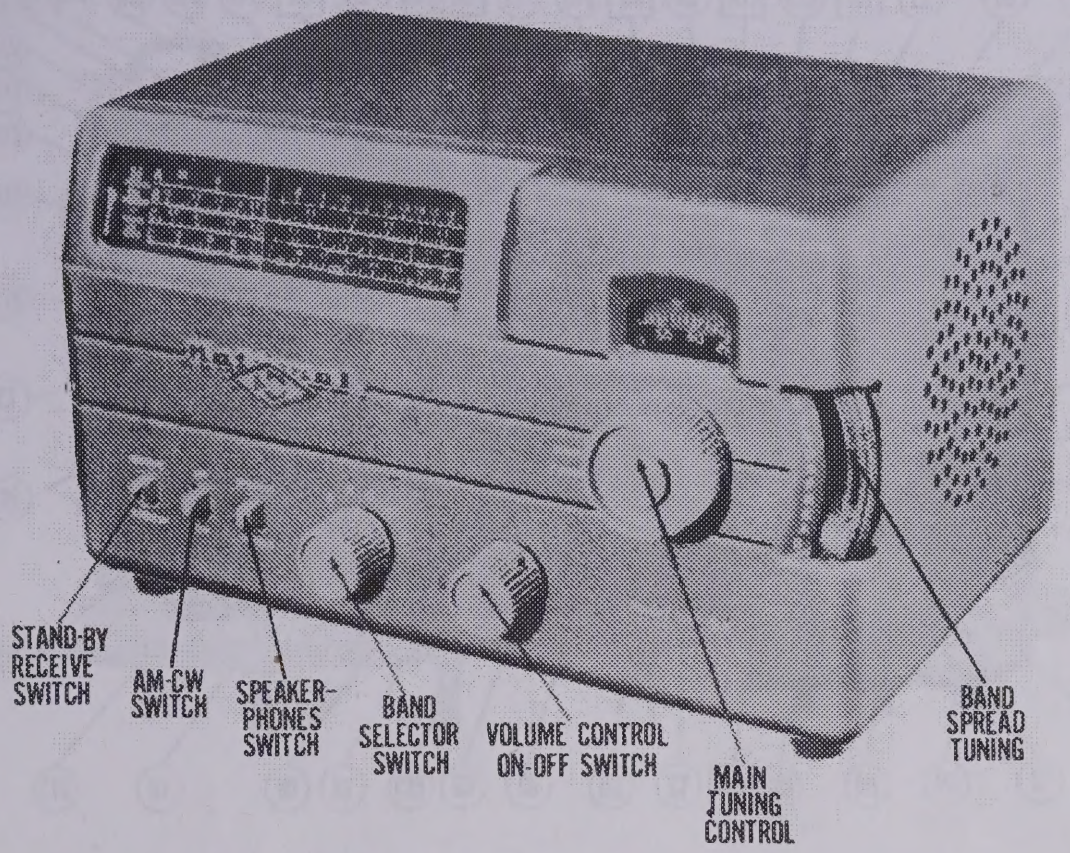
NATIONAL
MODEL SW-54



NATIONAL
MODEL SW-54

TRADE NAME	National, Model SW-54
MANUFACTURER	National Co., Malden, Mass.
TYPE SET	AC-DC Operated Multi-Band Superheterodyne Receiver
TUBES (FIVE)	Types 12BE6 Converter, 12BA6 CWO-IF Amp., 12AV6 Det.-AVC-AF, 50C5 Power Output, 25Z5GT Rectifier
POWER SUPPLY	105-130 Volts AC-DC RATING .26 Amp. @ 117 Volts AC
TUNING RANGE—	Band "A" .54-1.8MC, Band "B" 1.6-4.7MC, Band "C" 4.6-14.5MC, Band "D" 12-30MC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning gang fully closed and set pointer even with the left hand end of the white calibration lines.
Use isolation transformer if available. If not, connect a .1MFD capacitor in series with low side of signal generator and chassis.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 12BE6 (V1). Low side to chassis.	455KC (400~Mod.)	A	1.8MC	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.	300Ω	High side to left hand "A" terminal, (connect link). Low side to chassis.	1.6MC	"	"	"	A5, A6	Adjust for maximum output.
3.	"	"	4.5MC	B	4.5MC	"	A7, A8	"
4.	"	"	14MC	C	14MC	"	A9, A10	"
5.	"	"	30MC	D	30MC	"	A11, A12	"

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

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PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		NATIONAL PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T1	1.9KΩ	3Ω	100Ω	.5Ω		A-3330①	A-3025	RO-2 ①	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			NATIONAL PART No.	JENSEN PART No.	QUAM PART No.	
SP1	FIELD	V.C. IMP.	Q374-1	ST113 Mod. P4-X	4A1	
	P.M.	3Ω				
	CONE DIA.	V.C. DIA.				
SP2	4"	9/16"				

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA		NOTES
		PRI.	SEC.	NATIONAL PART No.	MEISSNER PART No.	
L1A	Ant. Coil	2Ω	3Ω	SA-7973		"A" Band
L1B	Ant. Coil	.9Ω	.8Ω			"B" Band
L1C	Ant. Coil	.8Ω	.1Ω			"C" Band
L2	Ant. Coil	.1Ω	0Ω	SA-7971		"D" Band
L3A	Osc. Coil	2.4Ω		SA-7981		"A" Band
L3B	Osc. Coil	1Ω				"B" Band
L3C	Osc. Coil	.1				"C" Band
L3D	Osc. Coil	0Ω				"D" Band
L4A	Input IF	20Ω	20Ω	Q242-1		Includes 2-87MMF Caps.
L4B	Input IF			Q243-1		Alternate
L5A	Output IF	20Ω	20Ω	Q242-2		Includes 2-110MMF Caps.
L5B	Output IF			Q243-2		Alternate

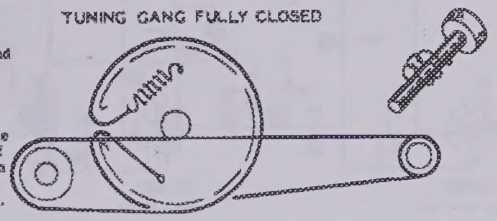
DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		NOTES
					NATIONAL PART No.		
M1	Bayonet	6-8	.15	Brown	F-138-11		Type number 47.

MISCELLANEOUS

ITEM No.	PART NAME	NATIONAL PART No.	NOTES
M2	Switch	SA-7972	Band
M3	Switch	SA-7978	Stand By - Receive
M4	Switch	SA-7977	A.M.-C.W.
M5	Switch	SA-7976	Speaker - Phones
M6	2 Gang Var. Cap.	K-577-2	(12-441MMF, 12-441MMF)
	Trimmer	D832-5	A2, A6, A7, A8, A9, A10, A11, A12
	Dial Scale	Q233-1	
	Cabinet	SA-7979	
	Dial Pointer	Q240-1	

TUNING GANG FULLY CLOSED



1. Length of cord 38" including clip at one end and loop in other. Measure 18 3/4" from clip end and mark this point. Loop cord at mark and push thru hole in shaft. Bring ends of cord thru loop as shown and pull taut keeping marked point over hole.

2. Wind clip end of cord 6 ½ turns around shaft and with tuning capacitor at maximum hook clip to large pulley. Turn capacitor to minimum allowing other end of cord to wind itself around shaft.

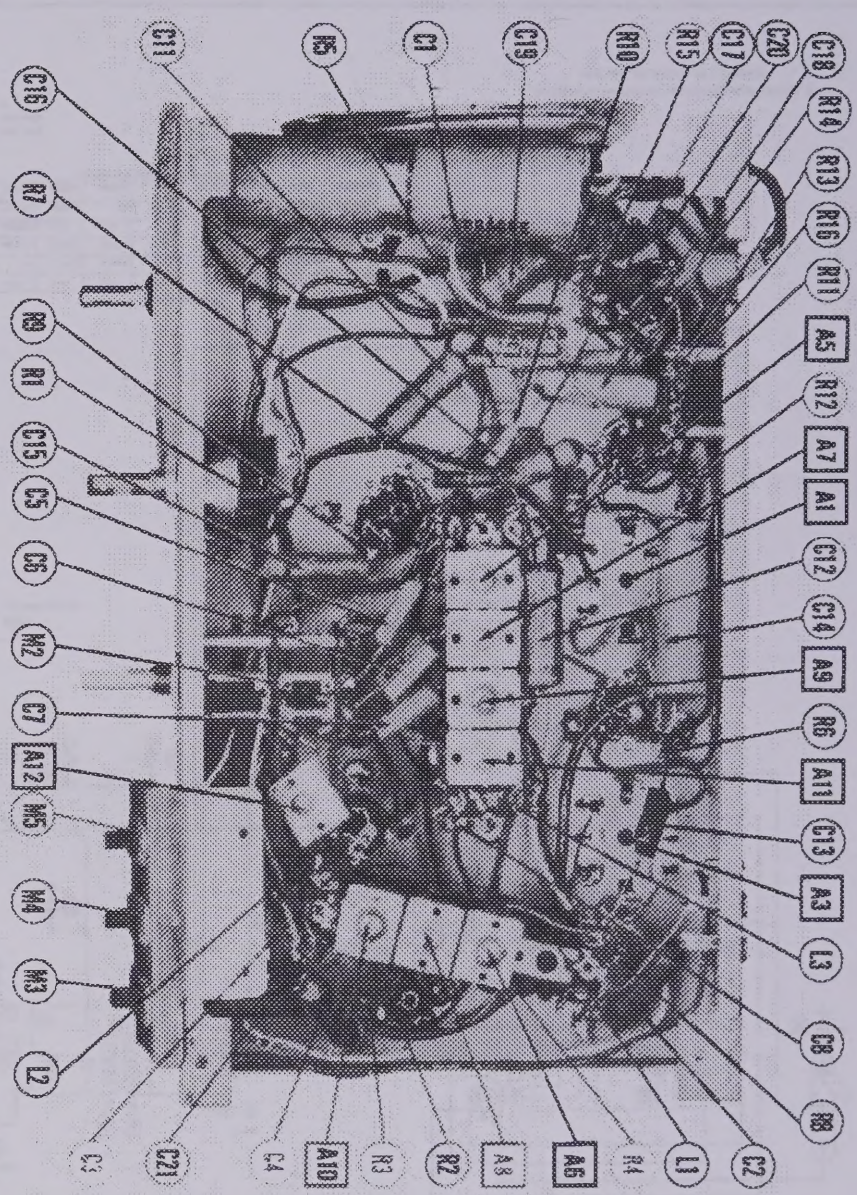
3. Pass cord around small pulley. Fasten spring to end of cord and clip to hole in pulley providing correct tension.

DIAL CORD DRIVE

SET 144

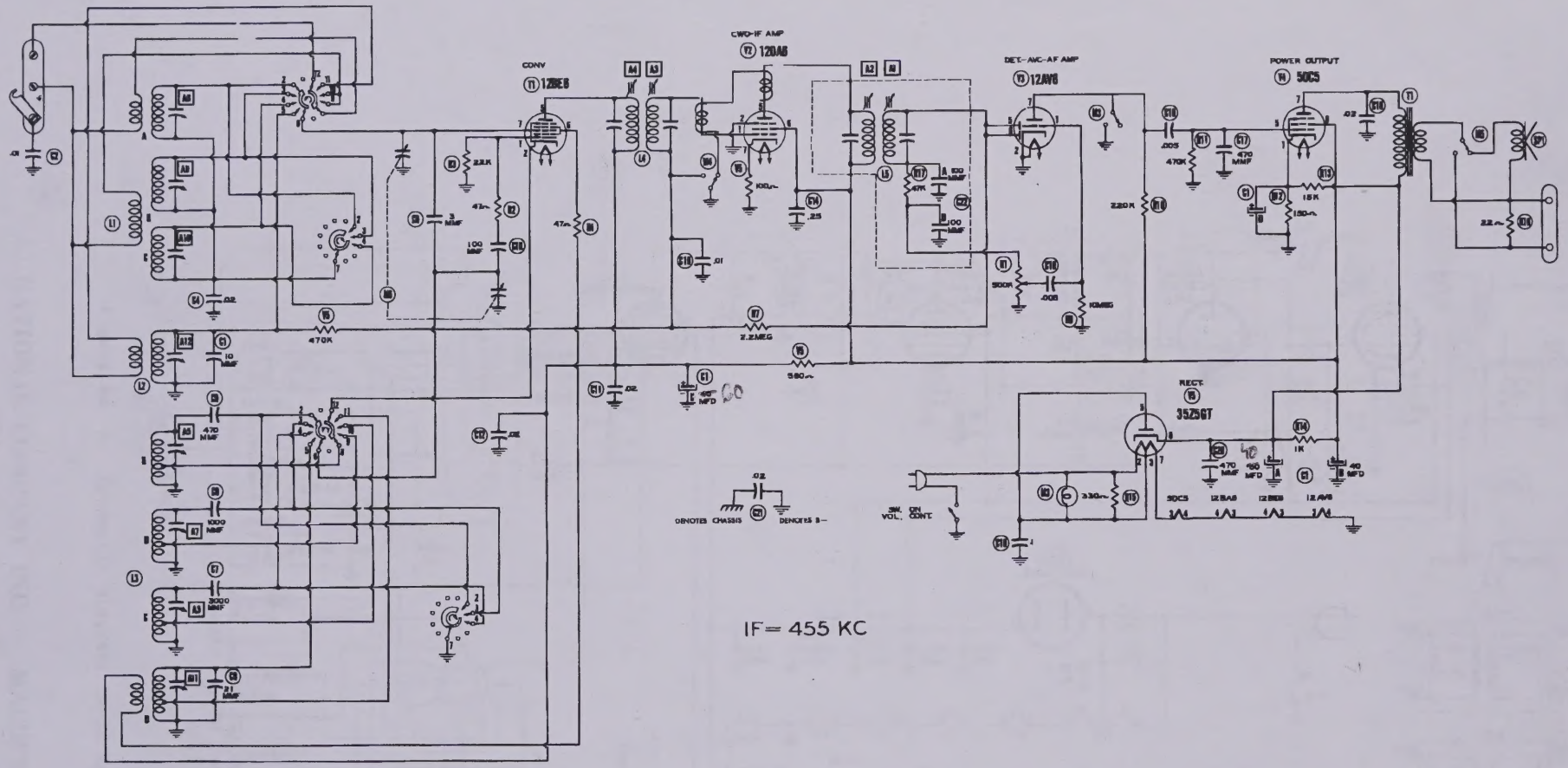
PAGE 9

CHASSIS—BOTTOM VIEW



NATIONAL MODEL SW-54

NATIONAL MODEL SW-54



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	12BE6	2-6.8VDC	0V	12VAC	24VAC	90VDC	82VDC	0V	
V 2	12BA6	0V	0V	24VAC	24VAC	98VDC	98VDC	1.1VDC	
V 3	12AV6	-.6VDC	0V	12VAC	0V	-.6VDC	- 0VDC	58VDC	
V 4	50C5	7.5VDC	0V	88VAC	88VAC	0V	80VDC	110VDC	
V 5	35Z5GT	88VDC	117VAC	117VAC	117VAC	0V	110VAC	115VDC	88VAC 115VDC

* TAKEN WITH VACUUM TUBE VOLTMETER

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	12BE6	220Ω	.1Ω	13Ω	24Ω	71.5KΩ	71.5KΩ	2.2Meg	
V 2	12BA6	2.72Meg	0Ω	30Ω	20Ω	71KΩ	71KΩ	100Ω	
V 3	12AV6	150Meg	0Ω	1Ω	0Ω	547KΩ	547KΩ	721.5KΩ	
V 4	50C5	180Ω	470KΩ	98Ω	35Ω	47KΩ	71KΩ	715Ω	
V 5	35Z5GT	18KΩ	18KΩ	120Ω	0Ω	120Ω	14KΩ	90Ω	14KΩ

ALL MEASUREMENTS TAKEN IN BAND "A" POSITION.
STAND BY-RECEIVE IN RECEIVE
AM-CW IN AM
SPEAKER-PHONES IN SPEAKER

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

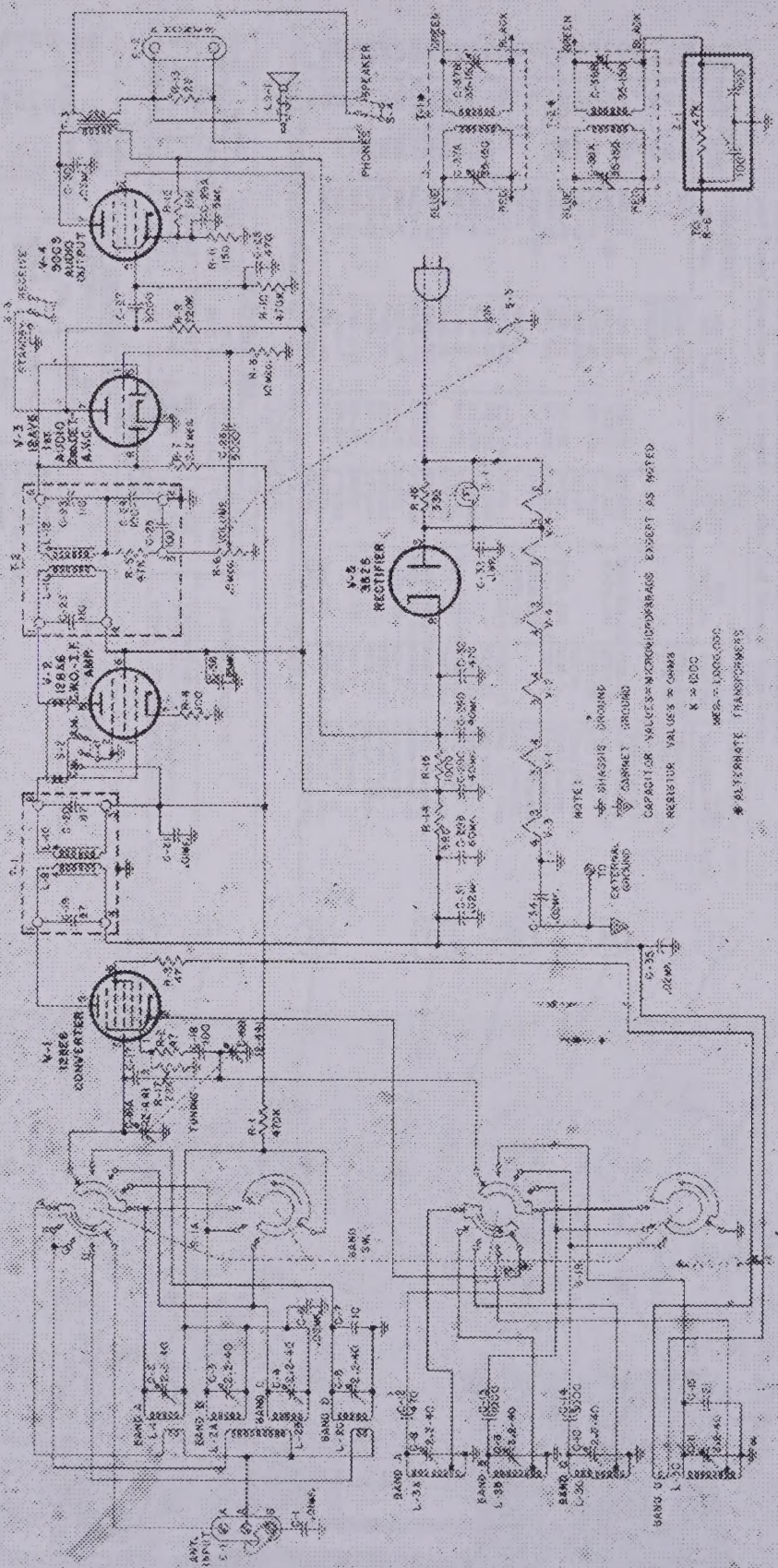


Figure No. 5. Schematic Diagram, SW-5# Receiver

SM-12000-1150
Printed in U.S.A.
ER307

PARTS LIST AND DESCRIPTIONS

NATIONAL MODEL SW-54

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: NATIONAL PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	Converter	12BE6	12BE6	7CH	
V2	CWO-IF Amplifier	12BA6	12BA6	7BK	
V3	Det. -AVC-AF	12AV6	12AV6	7BT	
V4	Power Output	50C5	50C5	7CV	
V5	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: NATIONAL PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	60	150	Q252-3	P85150/80-40420		UP84415C		TVA-3436	Filter
B	40	150		P85150/4				TVA-1418	Filter
C	40	150							Filter
D	5	15							Output Cathode
C2	.01	400	D827-5	P488-Q	D6-103	PTE4S1	GP2-333-103	4TM-S1	Ant. Isolation
C3	10		D827D-428	S10NPO	TCZ-10	SW5Q1	NPOK-10Q	5TCC-Q1	Fixed Trimmer
C4	.02	200	D827-51	P488-02	DF-203	PTE4S2		2TM-S2	AVC Filter
C5	470	500	J885-55	J488-0005		SR5TS		MS-35	Fixed Padder
C6	1000	500	J885-70	1488-001	D6-102	1WS1N	GP2L-102	1FM-B1	Fixed Padder
C7	3000	500	J885-30	1487-003	D6-302	1WS1D	GP2-333-302	1FM-23	Fixed Padder
C8	2t		D825D-410				NPOK-210		Fixed Trimmer
C9	3		J885-4	S3NPO			NPOK-030		Osc. Coupling
C10	100		J695-6	S100NPO	TCZ-100	SW5T1	NPO-333-10B	5TCC-T1	Osc. Grid Cap.
C11	.02	200	D827-51	P488-02	DF-203	PTE4S2		2TM-S2	Decoupling
C12	.02	200	D827-51	P488-02	DF-203	PTE4S2		2TM-S2	Decoupling
C13	.01	120	D827-5	P488-01	D6-103	PTE4S1	GP2-333-103	4TM-S1	AVC Filter
C14	.25	200	D827-15	P488-25		GT2P25		2TM-P25	IF Amp. Decoupling
C15	.005	200	D827-50	P888-005	D6-502	PTE8D5	GP2-333-502	8TM-D5	Audio Coupling
C16	.005	200	D827-50	P888-005	D6-502	PTE8D5	GP2-333-502	8TM-D5	Audio Coupling
C17	470	500	J865-58	1489-0005	D6-471	SR5T5	GP2K-471	MS-35	Output Grid
C18	.02	600	D827-44	P888-02	DF-203	PTE6S2		6TM-S2	Output Plate
C19	.1	400	D827-12	P488-1	DF-104	PTE4P1		4TM-P1	Rectifier Plate
C20	470	500	J865-58	1489-0005	D6-471	SR5T5	GP2K-471	MS-35	RF Bypass
C21	.02	600	D827-44	P888-02	DF-203	PTE6S2		6TM-S2	Pil. Isolation
C22 A	100		Q262-1 *	1488-0005	PC-56 *	SW5T1	GP1K-101	500C1 *	Diode RF Filter
B	100			1488-0005		SW5T1	GP1K-101		Diode RF Filter

* Items C22A, C22B, R17 are combined in one unit and used with 2nd IF transformer Part NO. Q243-2.

CONTROLS

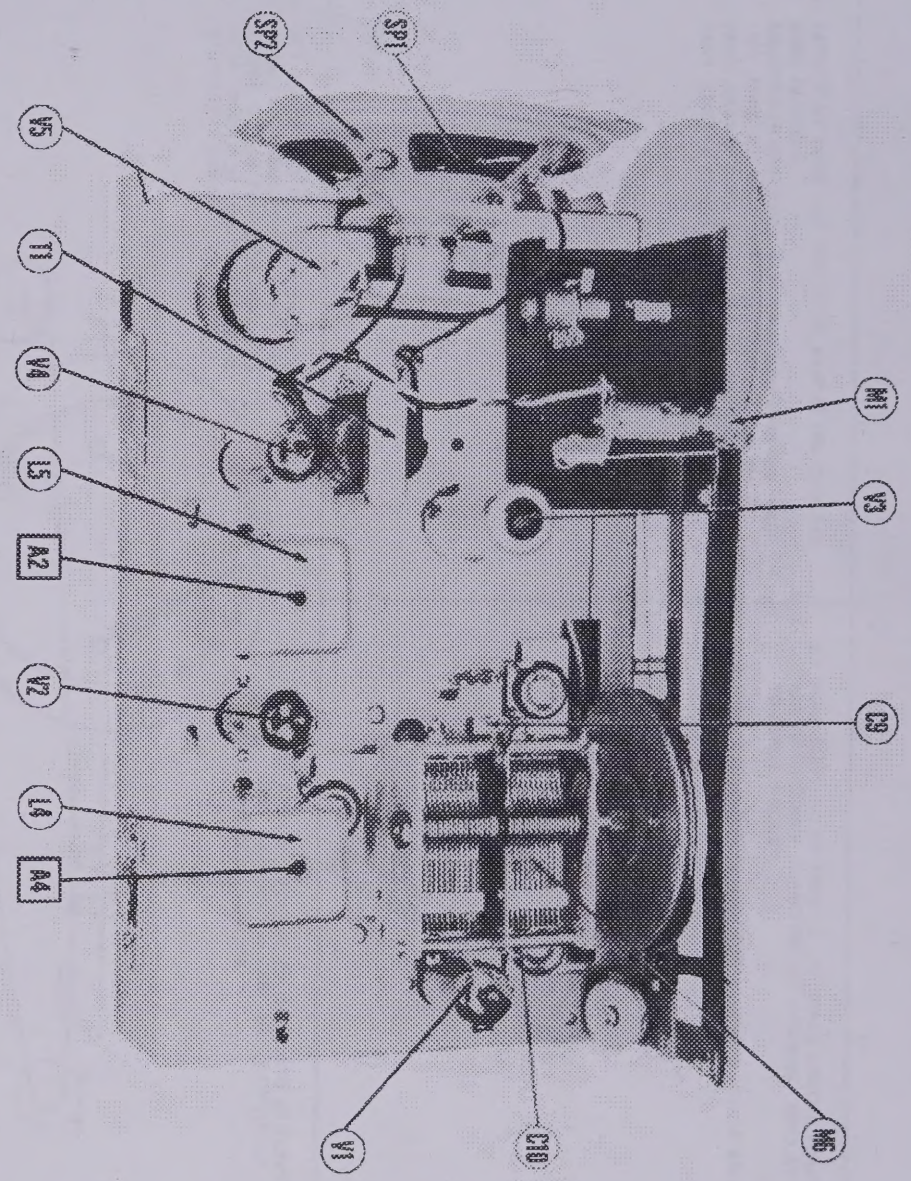
ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: NATIONAL PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	INSTALLATION NOTES
R1A	500KΩ	½	K347-8	Q13-133	AM-50-Z	B-50-S	Volume Control
B	Shaft		Not Req	Not Req	FS-3	Not Req	Attach to R1A Per Instructions
C	Switch		Not Req	78-1	SWB	Not Req	Attach to R1A Per Instructions

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: NATIONAL PART No.	IRC PART No.	IDENTIFICATION CODES
R2	47Ω	½	J588-9		Parasitic Suppressor
R3	22KΩ	½	J588-43	BTS-22K	Osc. Grid
R4	47Ω	½	J588-9		Parasitic Suppressor
R5	560Ω	½		BTS-560	Decoupling
R6	100Ω	½	J588-13	BTS-100	CWO-IF Amp. Cathode
R7	2.2Meg	½	J568-65	BTS-2.2Meg	AVC Network
R8	470KΩ	½	J588-57	BTS-470K	AVC Network
R9	10Meg	½	J562-73	BTS-10Meg	AF Amp. Grid
R10	220KΩ	½	J588-53	BTS-220K	AF Amp. Plate
R11	470KΩ	½	J588-57	BTS-470K	Output Grid
R12	150Ω	½	J588-15	BTS-150	Output Cathode
R13	15KΩ	1	J571-39	BTA-15K	Voltage Divider
R14	1000Ω	1	J571-25	BTA-1000	Filter
R15	330Ω	½	J588-39	BTS-330	Filament Shunt
R16	22Ω	½	J588-22		Output XFMR Shunt
R17	47KΩ	½	Q262-1 *	BTS-47K	Diode Filter

* Items R17, C22A, and C22B are combined into one unit and used when the 2nd IF XFMR Part NO. is Q243-2

CHASSIS—TOP VIEW



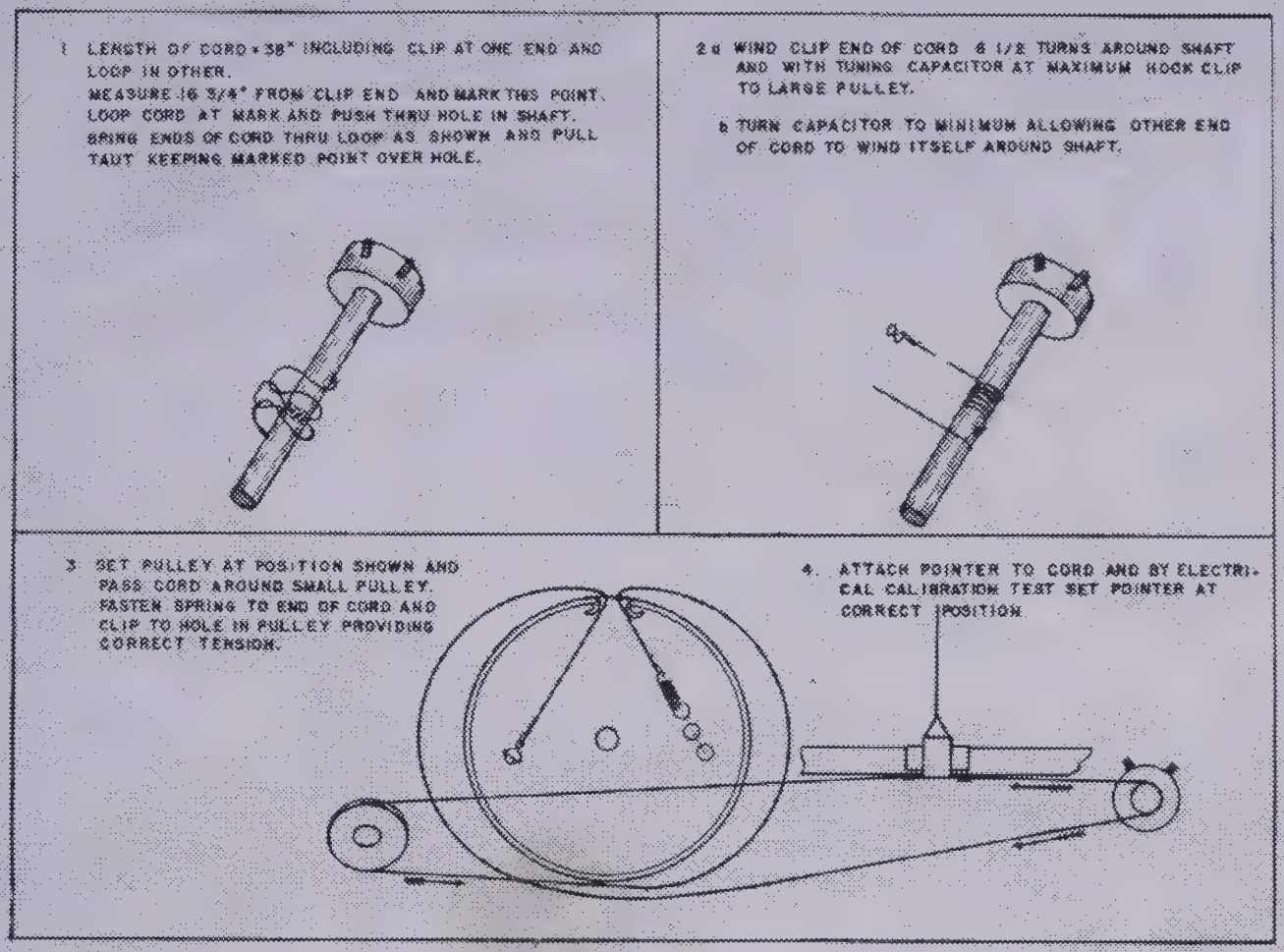

1 LENGTH OF CORD = 38" INCLUDING CLIP AT ONE END AND LOOP IN OTHER.
MEASURE 16 3/4" FROM CLIP END AND MARK THIS POINT. LOOP CORD AT MARK AND PUSH THRU HOLE IN SHAFT. BRING ENDS OF CORD THRU LOOP AS SHOWN AND PULL TAUT KEEPING MARKED POINT OVER HOLE.
2 a WIND CLIP END OF CORD 6 1/2 TURNS AROUND SHAFT AND WITH TUNING CAPACITOR AT MAXIMUM HOOK CLIP TO LARGE PULLEY.
b TURN CAPACITOR TO MINIMUM ALLOWING OTHER END OF CORD TO WIND ITSELF AROUND SHAFT.
3 SET PULLEY AT POSITION SHOWN AND PASS CORD AROUND SMALL PULLEY. FASTEN SPRING TO END OF CORD AND CLIP TO HOLE IN PULLEY PROVIDING CORRECT TENSION.
4. ATTACH POINTER TO CORD AND BY ELECTRICAL CALIBRATION TEST SET POINTER AT CORRECT POSITION

Figure No. 4. Dial Stringing Instructions

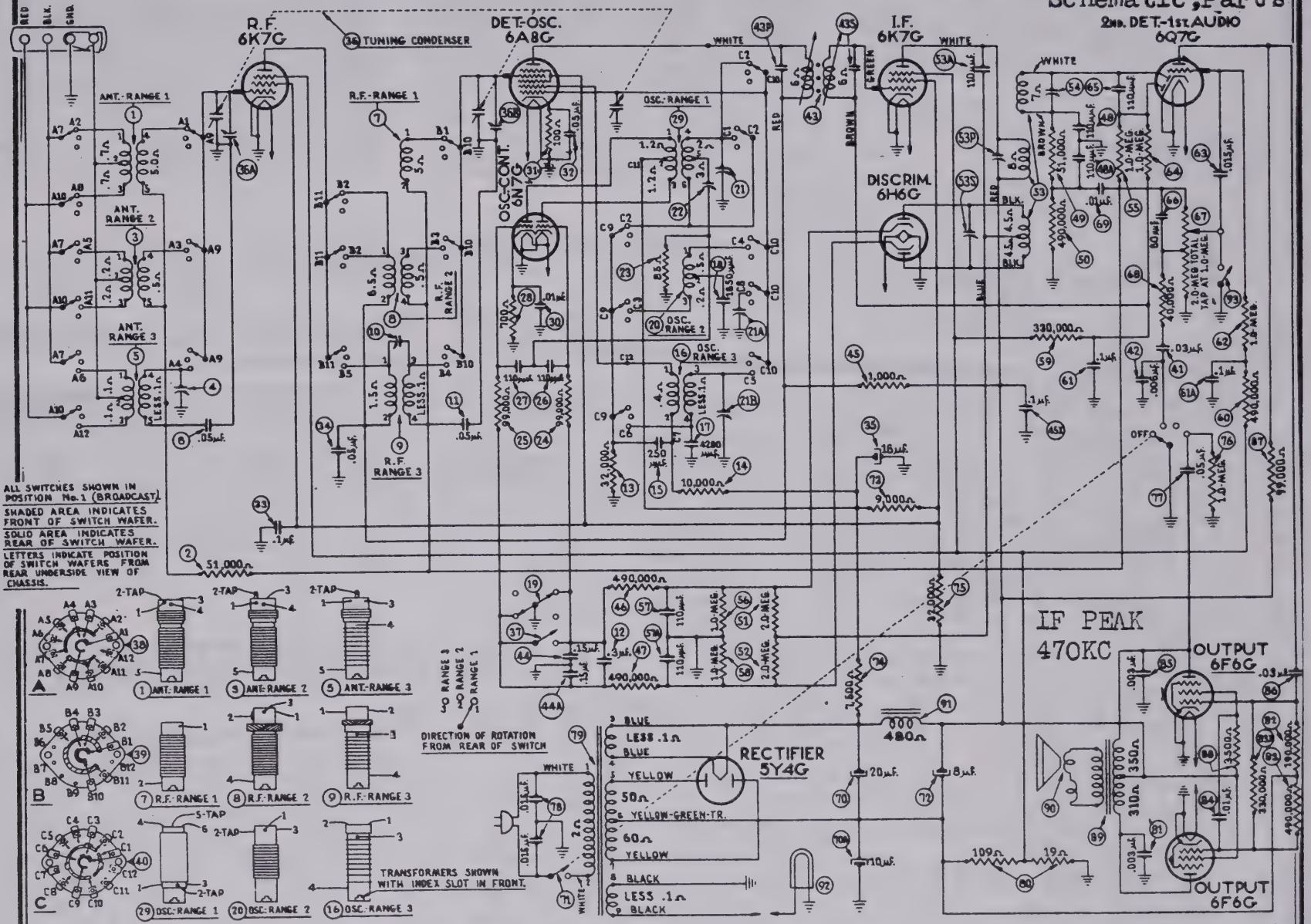
PARTS LIST

Symbol No.	Description	Nat. Co. Type
	CAPACITORS	
C-1	Paper .01 mfd 400 vdcw	D827-5
C-2	Variable mica 2.2-40 mmf 500 vdcw	D832-5
C-3	Variable mica 2.2-40 mmf	D832-5
C-4	Variable mica 2.2-40 mmf	D832-5
C-5	Variable mica 2.2-40 mmf	D832-5
C-6	Paper .02 mfd 200 vdcw	D827-51
C-7	Ceramic 10 mmf 500 vdcw	D8270-426
C-8	Variable mica 2.2-40 mmf	D832-5
C-9	Variable mica 2.2-40 mmf	D832-5
C-10	Variable mica 2.2-40 mmf	D832-5
C-11	Variable mica 2.2-40 mmf	D832-5

Symbol No.	Description	Nat. Co. Type
	CAPACITORS (CONT'D)	
C-12	Mica 470 mmf 500 vdcw	J665-55
C-13	Mica 1000 mmf 300 vdcw	J665-70
C-14	Mica 3000 mmf 500 vdcw	J665-30
C-15	Ceramic 21 mmf 500 vdcw	D8250-410
C-16	2 section variable	K577-2
C-16A	12 to 441.7 mmf	Part of C-16
C-16B	12 to 441.7 mmf	Part of C-16
C-17	Ceramic 3 mmf	J695-4
C-18	Ceramic 100 mmf	J695-8
C-19	87 mmf	Part of T-1

PHILCO RADIO & TELEV. CORP.

MODEL 37-9
Schematic, Parts

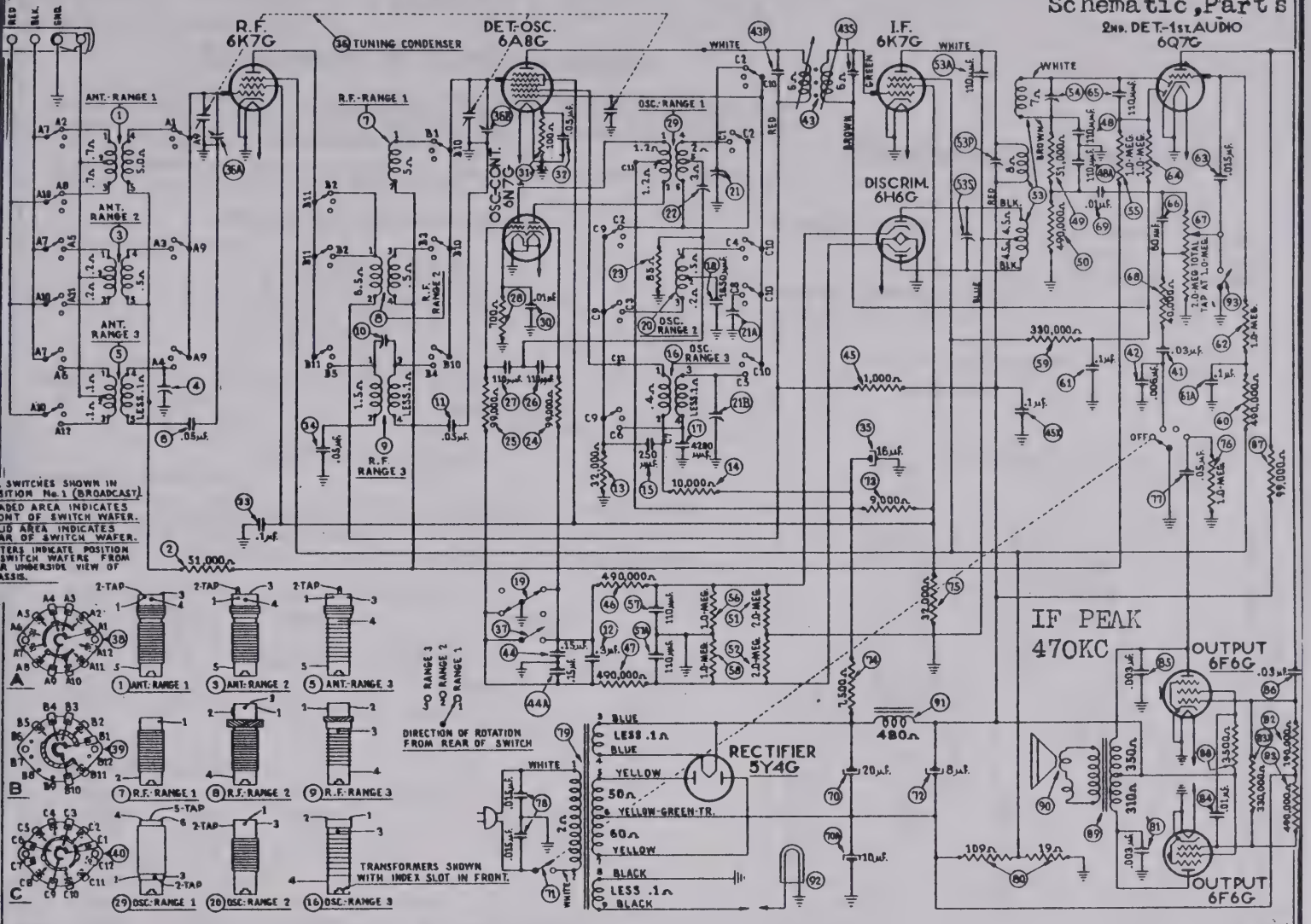


Schem. No.	Description	Part No.	List Price
1	Antenna Transformer (Range 1)	32-2378	$1.60
2	Resistor (51,000 ohms, ½ watt)	33-351339	.20
3	Antenna Transformer (Range 2)	32-2381	1.20
4	Compensator (Single)	31-6161	.30
5	Antenna Transformer (Range 3)	32-2384	1.20
6	Condenser (.05 mfd. tubular)	30-4444	.20
7	R. F. Transformer (Range 1)	32-2379	.40
8	R. F. Transformer (Range 2)	32-2382	1.00
9	R. F. Transformer (Range 3)	32-2385	1.20
10	Compensator (Single)	31-6160	.30
11	Condenser (.05 mfd. tubular)	30-4020	.20
12	Condenser (.15 double bakelite both sections used)	6287-DU	.40
13	Resistor (32,000 ohms, ½ watt)	33-332339	.20
14	Resistor (10,000 ohms, ½ watt)	33-310239	.20
15	Condenser (110 mmfd. mica)	30-1031	.20
16	Osc. Transformer (Range 3)	32-2387	1.20
17	Condenser (280 mmfd. mica)	30-1028	.20
18	Condenser (1850 mmfd. mica)	30-1033	.20
19	Resistor (490,000 ohms, ½ watt)	33-449339	.20
20	Osc. Transformer (Range 2)	32-2386	1.20
21	Compensator (Single)	31-6162	.30
22	Compensator (Single)	31-6163	.30
23	Resistor (85 ohms, ½ watt)	33-185339	.20
24	Resistor (99,000 ohms, ½ watt)	33-499339	.20
25	Resistor (99,000 ohms, ½ watt)	33-499339	.20
26	Resistor (99,000 ohms, ½ watt)	33-499339	.20
27	Resistor (99,000 ohms, ½ watt)	33-499339	.20
28	Condenser (.01 mfd. tubular)	30-4358	.20
29	Osc. Transformer (Range 1)	32-2388	1.20
30	Condenser (.01 mfd. tubular)	30-4358	.20
31	Resistor (100 ohms, ½ watt)	33-110339	.20
32	Condenser (.05 mfd. tubular)	30-4444	.20
33	Condenser (.1 mfd. tubular)	30-4359	.20
34	Condenser (.05 mfd. tubular)	30-4444	.20
35	Condenser (18 mfd. electrolytic)	30-1035	.40
36	Condenser (.05 mfd. tubular)	30-4444	.20
37	Condenser (.15 mfd. tubular)	30-4360	.20
38	Condenser (.3 mfd. tubular)	30-4361	.20
39	Condenser (.15 mfd. tubular)	30-4360	.20
40	Condenser (.3 mfd. tubular)	30-4361	.20
41	Condenser (.03 mfd. tubular)	30-4362	.20
42	Condenser (.006 mfd. tubular)	30-4363	.20
43	Condenser (.1 mfd. tubular)	30-4359	.20
44	Condenser (.15 mfd. tubular)	30-4360	.20
45	Resistor (1,000 ohms, ½ watt)	33-310139	.20
46	Resistor (490,000 ohms, ½ watt)	33-449339	.20
47	Resistor (490,000 ohms, ½ watt)	33-449339	.20
48	Resistor (1 megohm, ½ watt)	33-510339	.20
49	Resistor (490,000 ohms, ½ watt)	33-449339	.20
50	Resistor (490,000 ohms, ½ watt)	33-449339	.20
51	Resistor (2 megohm, ½ watt)	33-520339	$0.20
52	Resistor (2 megohm, ½ watt)	33-520339	.20
53	2nd I. F. Transformer (Discrim)	32-2376	3.30
54	Compensator	31-6147	.40
55	Resistor (1 megohm, ½ watt)	33-510339	.20
56	Resistor (1 megohm, ½ watt)	33-510339	.20
57	Condenser (110 mmfd. dual bakelite)	8035-DG	.25
58	Resistor (1 megohm, ½ watt)	33-510339	.20
59	Resistor (330,000 ohms, ½ watt)	33-433339	.20
60	Resistor (490,000 ohms, ½ watt)	33-449339	.20
61	Condenser (.1 mfd. dual bakelite)	4989-DG	.40
62	Resistor (1 megohm, ½ watt)	33-510339	.20
63	Condenser (.015 mfd. tubular)	30-4358	.20
64	Resistor (1 megohm, ½ watt)	33-510339	.20
65	Resistor (7 ohms, ½ watt)	33-107339	.20
66	Resistor (40,000 ohms, ½ watt)	33-440339	.20
67	Resistor (2.0 meg. total tap at 1.0 meg.)	33-520339	.20
68	Resistor (40,000 ohms, ½ watt)	33-440339	.20
69	Condenser (.01 mfd. tubular)	30-4358	.20
70	Condenser (20 mfd. electrolytic)	30-1036	.40
71	Condenser (.015 mfd. tubular)	30-4358	.20
72	Condenser (8 mfd. electrolytic)	30-1037	.40
73	Condenser (.015 mfd. tubular)	30-4358	.20
74	Resistor (3,600 ohms, ½ watt)	33-236139	.20
75	Resistor (32,000 ohms, ½ watt)	33-332339	.20
76	Resistor (1 megohm, ½ watt)	33-510339	.20
77	Condenser (.05 mfd. tubular)	30-4444	.20
78	Condenser (.015 mfd. tubular)	30-4358	.20
79	Condenser (.015 mfd. tubular)	30-4358	.20
80	Resistor (109 ohms, ½ watt)	33-101139	.20
81	Condenser (.003 mfd. tubular)	30-4365	.20
82	Resistor (330,000 ohms, ½ watt)	33-433339	.20
83	Resistor (330,000 ohms, ½ watt)	33-433339	.20
84	Condenser (.01 mfd. tubular)	30-4358	.20
85	Condenser (.003 mfd. tubular)	30-4365	.20
86	Condenser (.03 mfd. tubular)	30-4362	.20
87	Resistor (99,000 ohms, ½ watt)	33-499339	.20
88	Resistor (330,000 ohms, ½ watt)	33-433339	.20
89	Resistor (490,000 ohms, ½ watt)	33-449339	.20
90	Resistor (350 ohms, ½ watt)	33-035339	.20
91	Resistor (480 ohms, ½ watt)	33-048339	.20
92	Resistor (310 ohms, ½ watt)	33-031339	.20
93	Resistor (190,000 ohms, ½ watt)	33-419339	.20

Description	Part No.	List Price
Automatic Dial (complete)	31-1960	$25.00
Brace	28-4119	.05
Cable (A. C.)	L-2183	.40
Cable (speaker)	41-3258	.50
Coupling (Tuning Condenser)	31-1961	.80
Coupling (Range Switch)	28-7198	.15
Clip (Volume Shaft)	28-4394	.01
Control Screws (Station Index)	31-1898	.15
Dial	27-5283	
Dial Escutcheon Assembly	45-2324	.40
Gear "Front" (Dial Assembly)	45-2347	.60
Gear "Rear" (Dial Assembly)	45-2348	.60
Guide (Mask)	28-4118	.25
Handle (Dial)	45-2389	.50
Hub Assembly (Handle)	45-2344	.50

PHILCO RADIO & TELEV. CORP.

MODEL 37-9
Schematic, Parts



Schem. No.	Description	Part No.	List Price
1	Antenna Transformer (Range 1)	32-2378	$1.60
2	Resistor (51,000 ohms, ½ watt)	33-351339	.20
3	Antenna Transformer (Range 2)	32-2381	1.20
4	Compensator (Single)	31-6161	.30
5	Antenna Transformer (Range 3)	32-2384	1.20
6	Condenser (.05 mfd. tubular)	30-4444	.20
7	R. F. Transformer (Range 1)	32-2379	.40
8	R. F. Transformer (Range 2)	32-2382	1.00
9	R. F. Transformer (Range 3)	32-2385	1.20
10	Compensator (Single)	31-6160	.30
11	Condenser (.05 mfd. tubular)	30-4020	.20
12	Condenser (.15 double bakelite both sections used)	6287-DU	.40
13	Resistor (32,000 ohms, ½ watt)	33-332339	.20
14	Resistor (10,000 ohms, ½ watt)	33-310339	.20
15	Condenser (250 mmfd. mica)	30-1032	.25
16	Oscillator Transformer (Range 3)	32-2386	
17	Condenser (3500 mmfd.)	31-6156	.60
18	Condenser (1650 mmfd.)	31-6155	.40
19	Switch (Magnetic Tuning, manual)	42-1281	
20	Oscillator Transformer (Range 2)	32-2383	.70
21	Compensator (Three section)	31-6170	.75
22	Compensator (Osc. series)	31-6151	.40
23	Resistor (85 ohms, ½ watt)	33-085339	.20
24	Resistor (99,000 ohms, ½ watt)	33-399339	.20
25	Resistor (99,000 ohms, ½ watt)	33-399339	.20
26	Condenser (110 mmfd. mica)	30-1031	.20
27	Condenser (110 mmfd. mica)	30-1031	.20
28	Resistor (700 ohms, ½ watt)	33-170339	.20
29	Osc. Transformer (Range 1)	32-2373	1.60
30	Condenser (.01 mfd. tubular)	30-4479	.20
31	Resistor (100 ohms, ½ watt)	33-110339	.20
32	Condenser (.05 mfd. tubular)	30-4020	.20
33	Condenser (.1 mfd. tubular)	30-4455	
34	Condenser (.05 mfd. tubular)	30-4123	.20
35	Electrolytic Condenser (16 mfd.)	30-2118	1.65
36	Tuning Condenser	31-1963	4.00
37	Magnetic Tuning Switch (Automatic Dial)	45-2330	1.20
38	Range Switch (Ant.)	42-1282	.75
39	Range Switch (R. F.)	42-1283	.75
40	Range Switch (Osc.)	42-1284	
41	Condenser (.03 mfd. tubular)	30-4449	.20
42	Condenser (.006 mfd. tubular)	30-4445	.20
43	I. F. Transformer	32-2449	2.20
51	Resistor (2 megohm, ½ watt)	33-520339	$0.20
52	Resistor (2 megohm, ½ watt)	33-520339	.20
53	2nd I. F. Transformer (Discrim)	32-2376	3.30
54	Compensator	31-6147	.40
55	Resistor (1 megohm, ½ watt)	33-510339	.20
56	Resistor (1 megohm, ½ watt)	33-510339	.20
57	Condenser (110 mmfd. dual bakelite)	8035-DG	.25
58	Resistor (1 megohm, ½ watt)	33-510339	.20
59	Resistor (330,000 ohms, ½ watt)	33-433339	.20
60	Resistor (490,000 ohms, ½ watt)	33-449339	.20
61	Condenser (.1 mfd. dual bakelite)	4989-DG	.40
62	Resistor (1 megohm, ½ watt)	33-510339	.20
63	Condenser (.015 mfd. tubular)	30-4358	.20
64	Resistor (1 megohm, ½ watt)	33-510339	.20
65	Condenser (110 mmfd. mica)	30-1031	.20
66	Condenser (60 mfd. mica)	30-1040	.20
67	Volume Control	33-5158	1.00
68	Resistor (40,000 ohms, ½ watt)	33-340339	.20
69	Condenser (.01 mfd. tubular)	30-4479	.20
70	Electrolytic Condenser (10, 20 mfd.)	30-2183	2.00
71	Tone Control and A. C. Switch	42-1267	.75
72	Electrolytic Condenser (8 mfd.)	30-2024	1.10
73	Resistor (9,000 ohms, 2 watt)	33-290539	.30
74	Resistor (7,500 ohms, 3 watt)	33-275639	.30
75	Resistor (32,000 ohms, ½ watt)	33-332339	20
76	Resistor (1 megohm, ½ watt)	33-510339	.20
77	Condenser (.05 mfd. bakelite)	8326-SU	.35
78	Condenser (.015 mfd. dual bakelite)	3793-DG	.40
79	Power Transformer (115 A. C., 50 to 60 cycles)	32-7606	6.25
	(115 A. C., 25 to 40 cycles)	32-7607	9.00
80	Resistor Bias (128 ohms)	33-3280	.30
81	Condenser (.003 mfd. tubular)	30-4469	.20
82	Resistor (190,000 ohms, ½ watt)	33-419339	.20
83X	Resistor (330,000 ohms, ½ watt)	33-433339	.20
83	Resistor (490,000 ohms, ½ watt)	33-449339	.20
84	Condenser (.01 mfd. tubular)	30-4169	.20
85	Condenser (.01 mfd. tubular)	30-4469	.20
86	Condenser (.03 mfd. bakelite)	8318-SU	.35
87	Resistor (99,000 ohms, ½ watt)	33-399339	.20
88	Resistor (3500 ohms, ½ watt)	33-235339	.20
89	Output Transformer (H-30)	32-7754	1.50
90	Cone and Voice Coil (H-30)	36-3801	1.20
91	Field Coil (H-30)	36-3687	4.00
92	Pilot Lamp	34-2039	.07

Description	Part No.	List Price
Automatic Dial (complete)	31-1960	$25.00
Brace	28-4119	.05
Cable (A. C.)	L-2183	.40
Cable (speaker)	41-3258	.50
Coupling (Tuning Condenser)	31-1961	.80
Coupling (Range Switch)	28-7198	.15
Clip (Volume Shaft)	28-4394	.01
Control Screws (Station Index)	31-1898	.15
Dial	27-5283	
Dial Escutcheon Assembly	45-2324	.40
Gear "Front" (Dial Assembly)	45-2347	.60
Gear "Rear" (Dial Assembly)	45-2348	.60
Guide (Mask)	28-4118	.25
Handle (Dial)	45-2389	.50
Hub Assembly (Handle)	45-2344	.50
Housing (Control Screws)	28-7196	1.00
Mask and Link Assembly	45-2401	
Plate (Drive Mtg. Assembly)	45-2349	
Pilot Lamp Assembly	38-7706	.35
Reflector Ring	28-4630	.25
Ring (Retaining Mask Assembly)	28-7195	.20
Rubber (Chassis Mtg.)	27-4116	.08
Rubber Spacer (Chassis Mtg.)	27-4360	.04
Screen Holder Assembly	31-1968	
Shield (Chassis Bottom)	28-4626	.30
Shield (Tube—Square)	28-2726	.10
Shield (Tube—Round)	8005	.10
Shaft (Volume Control)	38-8285	
Shaft and Plate (Range Switch)	42-1287	.50
Spring (Volume Shaft)	28-4117	.40
Socket (7 prong)	27-6057	.11
Socket (8 prong)	27-6058	.11
Socket (Rectifier)	27-6052	.11
Spacer (Wood)	27-2116	.05
Terminal Panel (Ant.)	38-7714	.15
Vernier Drive	45-2342	2.40
Washer (Dial Scale)	27-8398	.01

CABINET PARTS

Baffle Speaker	16304	
Bezel Assembly	40-5980	
Bezel Gasket	27-8517	.05
Plate (Fibre)	27-7407	.01

MODEL 37-9
Alignment, Voltage
Chassis, Trimmers

PHILCO RADIO & TELEV. CORP.

Alignment of Compensators

EQUIPMENT REQUIRED: (1) Signal Generator; **Philco Model 088** (fundamental frequency 110 to 20,000 K. C.) is the correct instrument for this purpose; (2) Output meter; **Philco Model 025** Circuit Tester incorporates a sensitive output meter and is recommended; (3) Fibre handle screw-driver (Philco Part No. 27-7059); (4) Special variable condenser (Philco Part No. 45-2325).

OUTPUT METER: The 025 Output Meter is connected to the plate and cathode terminals of one of the (6F8G) tubes. Adjust the meter to use the (0-30) volt scale.

INTERMEDIATE FREQUENCY CIRCUIT

1. Set controls as follows:

a. Magnetic Tuning "off" (19)
b. Bass compensation minimum
c. Volume control maximum (67)
d. Receiver Dial 580 K. C.
e. Signal Generator 470 K. C.
f. Range switch position 1

2. Adjust the I. F. compensators for maximum with signal generator output lead connected through a .1 mfd. condenser to the grid of the tubes as follows:

Input Point	Compensators In Order
6A8G—1st Det.	(54) (53P) (43S) (43P)

RADIO FREQUENCY CIRCUIT

Tuning Range 530 to 1720 K. C.

1. Connect the signal generator output lead through a .1 mfd. condenser to terminal 1 and the generator ground to terminal 3 on aerial input panel. Terminals 2 and 3 must be connected with the shorting link provided on the aerial panel.

2. Other controls set as given under intermediate frequency circuit, with the exception of those as follows:

Adjust compensators for maximum output as follows:

Range Switch	Signal Generator	Receiver Dial	Compensators In Order
1	1600 K. C.	1600 K. C.	(21) (36B) (36A)
1	580 K. C.	580 K. C.	(22) Roll gang through signal when padding this compensator
1	1600 K. C.	1600 K. C.	(21)
1	1500 K. C.	1500 K. C.	(36A) (36B)

Tuning Range 2.3 to 7.4 M. C.

Adjust compensators for maximum output as follows:

Range Switch	Signal Generator	Receiver Dial	Compensators In Order
2	6 M. C.	6 M. C.	(21A)

Tuning Range 7.35 to 22 M. C.

Adjust compensators for maximum output as follows:

Range Switch	Signal Generator	Receiver Dial	Compensators In Order
3	18 M. C.	18 M. C.	(21B) Check image at 17.06 M. C.
3	18 M. C.	18 M. C.	(10) (4) Use shunt condenser on (21B) or rock gang through signal when padding compensator No. 10
3	18 M. C.	18 M. C.	(21B)

MAGNETIC TUNING ADJUSTMENT—Set the range switch in position one (530 to 1720 K. C.) and the magnetic tuning switch in the "out" position. Now turn the signal generator and receiver dial to any frequency in the Broadcast band. The receiver dial must be adjusted very accurately for maximum output.

Set the magnetic tuning control in the "on" position (clockwise). Compensator (53S) of the magnetic tuning transformer is now adjusted for maximum output.

The above adjustment is now checked for accuracy, by turning the magnetic tuning control "off" and "on." When this is done, there should be no change in the tone of the received signal. If a change of tone or hiss develops, it indicates a shift in frequency and the adjustment must be made again.

Electrical Specifications

Power Supply: Voltage	Frequency Cycles	Consumption
115	50 to 60	110 watts
115	25 to 40	110 watts

Intermediate Frequency: 470 K. C.

Undistorted Output: 5 watts.

Tone Control: 3 positions.

Speaker: H-30.

December, 1936

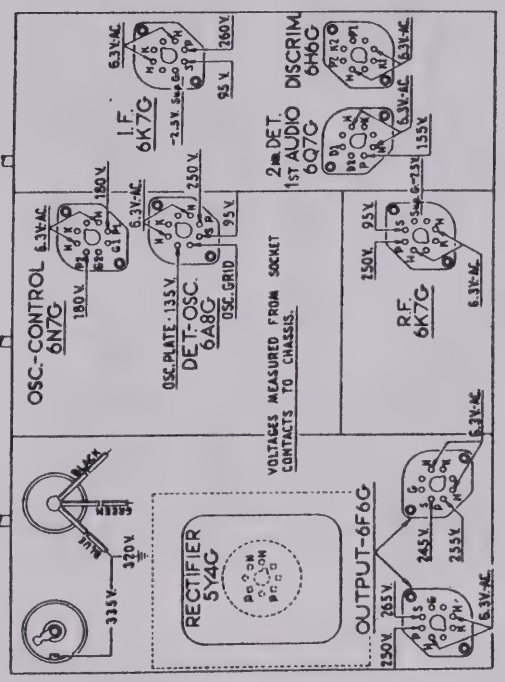


Fig. 1—Receiver Socket Voltages

The voltages indicated by arrows were measured with a Philco 025 Circuit Tester which contains a voltmeter having a resistance of 1000 ohms per volt. Volume Control at minimum, range switch in broadcast position, line voltage 115 A. C.

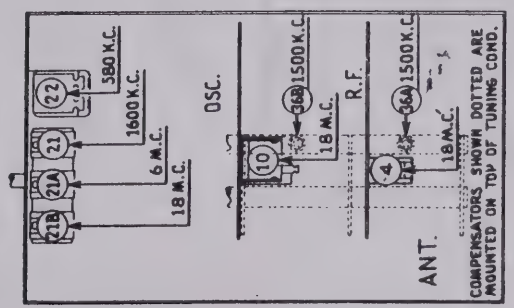
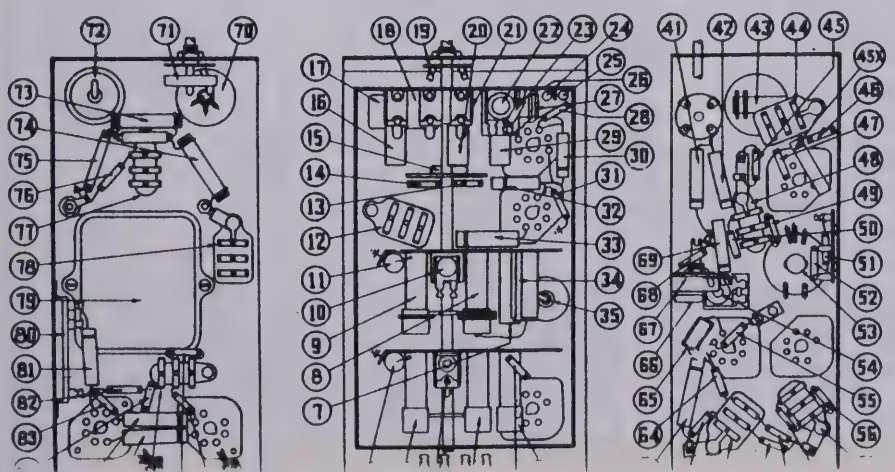
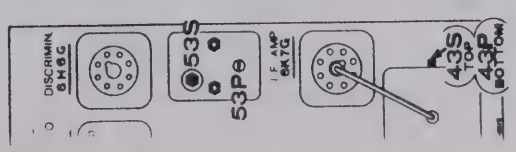


Fig. 3—R. F. Compensators





. Compensators

Alignment of Compensators

EQUIPMENT REQUIRED: (1) Signal Generator; **Philco Model 088** (fundamental frequency 110 to 20,000 K. C.) is the correct instrument for this purpose; (2) Output meter; **Philco Model 025** Circuit Tester incorporates a sensitive output meter and is recommended; (3) Fibre handle screw-driver (Philco Part No. 27-7059); (4) Special variable condenser (Philco Part No. 45-2325).

OUTPUT METER: The 025 Output Meter is connected to the plate and cathode terminals of one of the (6F6G) tubes. Adjust the meter to use the (0-30) volt scale.

INTERMEDIATE FREQUENCY CIRCUIT

1. Set controls as follows:

a. Magnetic Tuning "off" (19)
b. Bass compensation minimum
c. Volume control maximum (67)
d. Receiver Dial 580 K. C.
e. Signal Generator 470 K. C.
f. Range switch position 1

2. Adjust the I. F. compensators for maximum with signal generator output lead connected through a .1 mfd. condenser to the grid of the tubes as follows:

Input Point	Compensators in Order
6A8G—1st Det.	(54) (53P) (43S) (43P)

RADIO FREQUENCY CIRCUIT

Tuning Range 530 to 1720 K. C.

1. Connect the signal generator output lead through a .1 mfd. condenser to terminal 1 and the generator ground to terminal 3 on aerial input panel. Terminals 2 and 3 must be connected with the shorting link provided on the aerial panel.

2. Other controls set as given under intermediate frequency circuit, with the exception of those as follows:

Adjust compensators for maximum output as follows:

Range Switch	Signal Generator	Receiver Dial	Compensators in Order
1	1600 K. C.	1600 K. C.	(21) (36B) (36A)
1	580 K. C.	580 K. C.	(22) Roll gang through signal when padding this compensator
1	1600 K. C.	1600 K. C.	(21)
1	1500 K. C.	1500 K. C.	(36A) (36B)

Tuning Range 2.3 to 7.4 M. C.

Adjust compensators for maximum output as follows:

Range Switch	Signal Generator	Receiver Dial	Compensators in Order
2	6 M. C.	6 M. C.	(21A)

Tuning Range 7.35 to 22 M. C.

Adjust compensators for maximum output as follows:

Range Switch	Signal Generator	Receiver Dial	Compensators in Order
3	18 M. C.	18 M. C.	(21B) Check image at 17.06 M. C.
3	18 M. C.	18 M. C.	(10) (4) Use shunt condenser on (21B) or rock gang through signal when padding compensator No. 10
3	18 M. C.	18 M. C.	(21B)

MAGNETIC TUNING ADJUSTMENT—Set the range switch in position one (530 to 1720 K. C.) and the magnetic tuning switch in the "out" position. Now turn the signal generator and receiver dial to any frequency in the Broadcast band. The receiver dial must be adjusted very accurately for maximum output.

Set the magnetic tuning control in the "on" position (clockwise). Compensator (53S) of the magnetic tuning transformer is now adjusted for maximum output.

The above adjustment is now checked for accuracy, by turning the magnetic tuning control "off" and "on." When this is done, there should be no change in the tone of the received signal. If a change of tone or hiss develops, it indicates a shift in frequency and the adjustment must be made again.

Electrical Specifications

Power Supply: Voltage	Frequency Cycles	Consumption
115	50 to 60	110 watts
115	25 to 40	110 watts

Intermediate Frequency: 470 K. C.

Undistorted Output: 5 watts.

Tone Control: 3 positions.

Speaker: H-30.

December, 1936

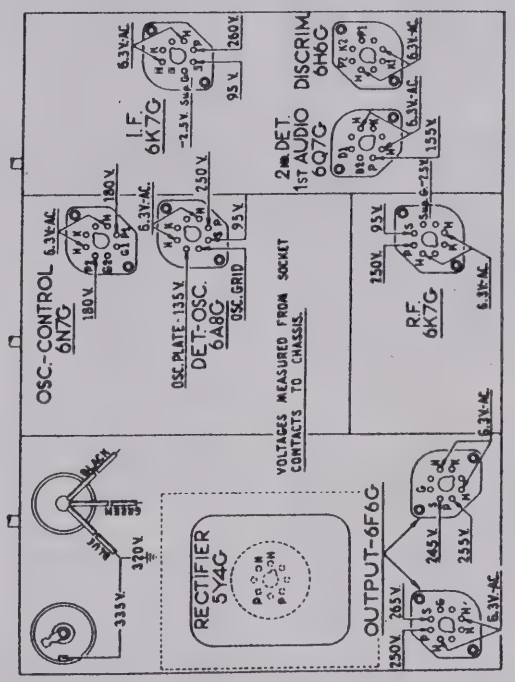


Fig. 1—Receiver Socket Voltages

The voltages indicated by arrows were measured with a **Philco 025 Circuit Tester** which contains a voltmeter having a resistance of 1000 ohms per volt. Volume Control at minimum, range switch in broadcast position, line voltage 115 A. C.

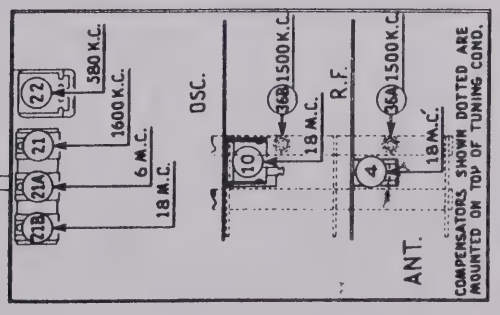


Fig. 3—R. F. Compensators

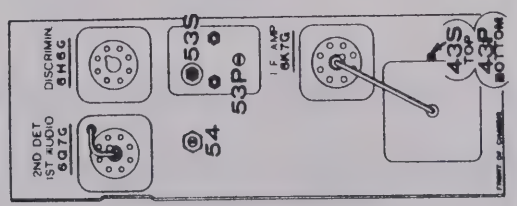


Fig. 2—I. F. Compensators

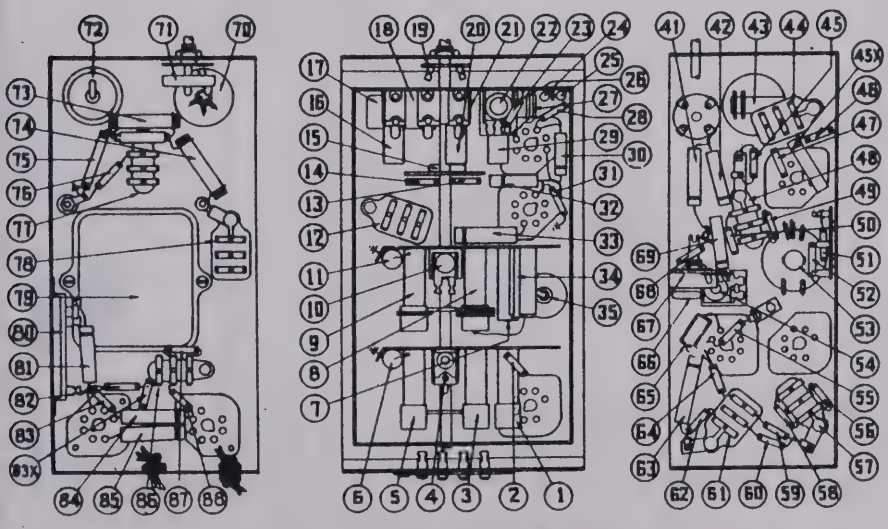


Fig. 4—Part Locations, Underside of Chassis

G.E. D-51, D-52

A switch is provided in these chassis which is used to cut in and out a series audio coupling condenser between the plate of the 37 second detector-avc-avc tube, and the control grid of the 41 output tub. In most cases it has been found best to allow this switch to remain closed all the time; therefore, its usefulness can be increased by making the following changes:

Disconnect the two wires connected to the switch, S2, in the schematic found on *RCA page 6-9 in Rider's Volume VI*, and after soldering them together, tape them.

Connect a wire from the control grid cap connection of the 37 to one terminal of the switch. To the other terminal of S2, connect one side of a 0.0015-mf condenser and connect the other side of the condenser to the case of the receiver.

This procedure provides a tone control which is extremely effective in reducing the tube hiss on weak signals. When the incoming signal is strong, the condenser may be switched out of the circuit, which gives the best fidelity. This type of tone control is more effective in reducing noise than the usual type of control connected across the output of the 41 power amplifier.

Motorola 5T-71A

The schematic for this chassis is the same as that shown on *page 3-2 in Rider's Volume III* and *on page 1954 in the Rider Combination Manual*, with the following changes:

The 0.25-megohm and 1-megohm resistors in series in the plate circuit of the third 24 r-f tube and the 0.1-mf by-pass condenser from their junction, have been replaced with a choke having the same parts number as the one shown in the grid circuit of the 17(A output tube. This choke is connected directly between the plate of the 24 tube and the +B lead.

The choke in the grid circuit of the output tube has been replaced with a 0.2-megohm resistor.

Mid-West 7-36

As was noted on *page 7-2 in Rider's Volume VII*, the tube complement of the late model of this receiver was changed, four metal tubes being employed. Below will be found the voltage data for both the early and the late models.

Early 7-36

Tube		Plate	Screen	Cathode	Supp.	Grid
58	R-F	235	80	[illegible]	)	AVC
56	Osc.	220	—	[illegible]	[illegible]	—
58	Mixer	225	80	[illegible]	[illegible]	AVC
58	1st I.F	190	80	[illegible]	)	AVC
55	2nd Det.	21	1	[illegible]	1	0
2A5	Output	220	145	7	0	17.5
80	Rect.	340 volts from [illegible]				

Filament voltage, 2.5

Late 7-36

Tube		Plate	Screen	Supp.	Cathode
6K7	R-F	275	100	0	0
6K7	Mixer	225	100	0	2
6Q7	Osc.	150	1	0	0
75	2nd Det-AV.	20	1	0	0
		0			
42	Output	265	250	0	0
80	Rect.	350 A-C			

Filament voltage, 6.9 Volume control at maximum

Arvin Chassis 518

In order to correct the calibration of the dial, the following procedure is to be used:

Rotate the dial pointer to 550 kc. Press with the thumb on the dial face above its center. Rotate the tuning knob while preventing the dial pointer *from moving*. This will enable the position of the dial pointer to be varied with respect to the tuning condenser and makes it possible to readjust the calibration without removing the chassis from its cabinet.

For other servicing data see *pages 8-10, 8-11, and 8-13 in Rider's Volume VIII.*

G.E. B-40

The schematic of this receiver, which is the same as RCA M-34, is shown on *RCA page 3-14 of Rider's Volume III and page 1854 of the Rider Combination Manual*. The change explained below will increase the audio gain on medium and strong signals and also improve the A.V.C. action. The partial schematic shown herewith are the original and revised circuits.

Interchange the connections at the terminal board of the red and green wires from the volume control. This places the grid coupling condenser in the circuit of the movable arm of the volume control. Then disconnect the green A.V.C. lead from the terminal board. (This lead is connected to the second terminal from the end on the bottom side of the terminal strip.) Solder a small 2-megohm resistor to this lead and solder the other end of the resistor to the lug on the terminal board to which the green lead from the volume control is attached.

Lafayette M-31 (1935)

Please make this change on the lower schematic on *Lafayette page 8-6 in Rider's Volume VIII*: A connection should be made where the lead from B+ crosses the lead from the plate of the 58. A jumper appears there in the schematic.

Philco 602

The tap between the voice coil and the hum bucking coil should be grounded to minimize hum. See schematic on *page 7-83 of Rider's Volume VII.*

The 133-15 ohms resistor, No. 36, has a part number 33-3235 instead of 33-3225.

Beginning with Run No. 3, the tuning condenser assembly was changed to a vernier type. The part number of this condenser, scale, and pointer remain the same.

The 1-megohm resistor, No. 40 had a rating of ¼ watt. This should be replaced with a ½ watt resistor of the same resistance value; the Part No. 33-510344.

Philco 270

Please make a note in your Index to Rider's Manuals that the parts list of Model 70 applies to the schematic of Model 270, found on *page 1-28 of the revised edition of Rider's Volume I; on page 1466-C of the early edition; and on page 1657 of the Rider Combination Manual.*

Philco 116

A 50-mmf. condenser has been added from the end terminal of condenser No. 63 (see schematic on *page 6-11 of Rider's Volume VI*) to ground. This addition was made to prevent oscillation.

As of Run No. 14, the 1-megohm resistor, No. 81, has been changed from Part No. 4409 to 33-510344.

A change has been made in the design of the volume control, No. 66 on the schematic, the old part number was 33-5022 and this has been replaced with Part No. 33-5153.

The Model K-17 speaker, Part No. 36-1025, is used on the new Model 116-B. The cone assembly number is 02996; the field coil and pot assembly is 36-3104.

Philco 116X

The resistance of the field coil, No. 95 on the schematic shown on *page 6-13 of Rider's Volume VI*, is shown as 1125 ohms. Change notes from the manufacturer state that this value is 1450 ohms.

The volume control No. 68 has been changed from Part No. 33-5110 to 33-5155.

Philco I-F Transformers

The i-f transformers of several models have been changed and are listed below. In each case the new part number of the first i-f transformer is 32-2296 and that of the second i-f transformer is 32-2298.

Model	*Parts List on Page*	*Rider's Volume*
37-33	7-15	VII
37-34	8-17	VIII
37-38*	7-17	VII
37-623	7-55	VII
37-624	8-23	VIII

The second i-f transformer has a tertiary winding which is connected in series with the screen-grid circuit of the 1D5G i-f tube.

*In order to prevent oscillation in the i-f circuit of Model 37-38, a tubular condenser, Part No. 30-4020, 0.05 mf, is connected from the screens of the 1C7G detector-oscillator and the 1D5G i-f tubes to ground.

Philco 37-9, Code 121

Run No. 2. Condenser No. 25 has been changed from 16 mf to 18 mf, Part No. 30-2194.

To improve the operation of the i-f circuit, a 0.1-mf condenser, Part No. 30-4455, has been connected from the red lead of the primary of the i-f transformer, No. 53, to ground.

To prevent distortion at minimum volume, the green-white wire connecting the center lug of the volume control, No. 67, to the automatic tuning dial s-f switch, No. 93, must be kept clear of the compensator, No. 54, and the diode circuit of the 6Q7G.

Run No. 3. Condensers 70 and 70A have been replaced by 8- and 10-mf condensers respectively, Part No. 30-2201. The 8-mf condenser, No. 72, has been replaced by a 18-mf condenser, Part No. 30-2200.

The schematic of this receiver will be found on *page 8-11 of Rider's Volume VIII.* Note that the dial calibration notes of Model 37-10, see *page 8-15*, can be used for calibrating the dial of Model 37-9.

Philco 38-39

In order to reduce maximum volume buzz, the following parts were changed: the 11.7-ohm resistor, No. 22, was changed to 12.3 ohms; the 2-megohm resistor, No. 30, was changed to 4 megohms; and the 160,000-ohm resistor, No. 27, was changed to 240,000 ohms. See schematic on *page 8-75 of Rider's Volume VIII.*

Philco 38-4, 38-5

When either of these models are operated on 25 cycles, a power transformer, Part No. 32-7598 must be employed. Also a 0.1-mf condenser must be connected across the speaker field coil, No. 65.

In order to reduce station rumble in the Model 38-4, the following parts were changed: the 0.01-mf condenser, No. 36, was changed to 0.0015 mf. and the 40,000-ohm resistor, No. 38, changed to 32,000 ohms.

In order to reduce frequency drift at the high-frequency end of the broadcast tuning range, in Run No. 3 the compensator No. 16, 1500 kc, Part No. 31-6196, was replaced with Part No. 31-6206, and two condensers, Part No. 30-1097, are connected in parallel with the new condenser. The range 1 oscillator transformer, No. 15, was changed from Part No. 32-2631 to 32-2894.

In Run No. 4 of 38-4 and Run No. 2 of 38-5, the 70,000-ohm resistor, No. 19, was changed to 51,000 ohms to improve the performance of the oscillator circuit on the short-wave bands. For schematic see *pages 8-61 in Rider's Volume VIII.*

Philco 38-7, Codes 121,124

Run No. 2 To provide uniform performance of the oscillator circuit, a 20-ohm resistor was connected in series with the cathode of the 6A8G detector-oscillator tube. See schematic on *page 8-65 of Rider's Volume VIII.*

In order to reduce bass response, the following parts were changed in the Code 124 chassis:

Condenser, No. 24, was changed from 0.01 mf to 0.001 mf, Part No. 30-4201, Resistor, No. 32, was changed from 51,000 ohms to 40,000 ohms, Part No. 33-340339. Condenser, No. 38, was changed from 0.066 mf to 0.01 mf, Part No. 30-4479.

Run No. 3. To reduce frequency drift further at the high-frequency end of the broadcast range, the compensator, No. 7A, was replaced with Part No. 31-6206. Also a new thermal compensator was connected in parallel with compensator, No. 7A and mounted near resistor No. 12. The resistor is mounted in the chassis with a mounting clamp and an asbestos insulator. The resistor must be mounted like this or else the thermal compensator will not function properly.

Run No. 4. The thermal compensator added to the chassis in Run No. 3, was replaced by two fixed condensers, Part No. 30-1097.

Run No. 5. The 20-ohm resistor added in Run No. 2 was removed.

The part numbers of Nos. 26, 39, and 48 found in the list of parts on *page 8-66* are correct for Models 38-8 and 38-9. The correct part numbers for Model 38-7, both codes, follow:

No. 26, Volume Control, Part No. 33-5225; No. 39, Tone Control, Part No. 42-1347; and No. 48, Range Switch, Part No. 42-1339.

Philco 38-8, Code 121

Run No. 2. In order to increase the sensitivity of the shadowmeter, the following changes were made: Resistor, No. 12, was changed from 10,000 ohms to 13,000 ohms, Part No. 33-313639 and condenser, No. 17, was changed from 0.05 mf to 0.25 mf, Part No. 30-4134. See schematic on *page 8-65 of Rider's Volume VIII.*

Run No. 3. To provide uniform performance of the oscillator circuit, a 20-ohm resistor was connected in series with the cathode of the 6A8G detector-oscillator tube.

Run No. 4. In order to increase the r-f response in the high frequencies, condenser No. 40, was changed from 0.003 mf to 0.004 mf, Part No. 30-4456.

Run No. 5. The 20-ohm resistor added in Run No. 3, was removed.

Philco 610

We have been advised by the manufacturer that the following changes should be made in the schematic numbers of this model found on *page 6-19 of Rider's Volume VI:* the schematic number 54 should be changed to 41; No. 41 to 56; No. 56 to 54; No. 39 to 40; and No. 40 to 39. This will make the numbers of the wiring diagram, the base view, and the parts list agree.

Beginning with Run No. 15, the oscillator circuit of the second type of this chassis (*see page 7-87 of Rider's Volume VII*) was changed to improve the oscillator action at 6.0 mc. Resistors No. 17 and No. 18 (51,000 ohms and 25,000 ohms) were removed. A 32,000-ohm resistor (Part No. 33-332133) was added from the switch terminal side of condenser No. 7 in the antenna circuit to ground. A 20-ohm resistor, Part No. 33-020133 was connected between the 6A7 cathode and ground.

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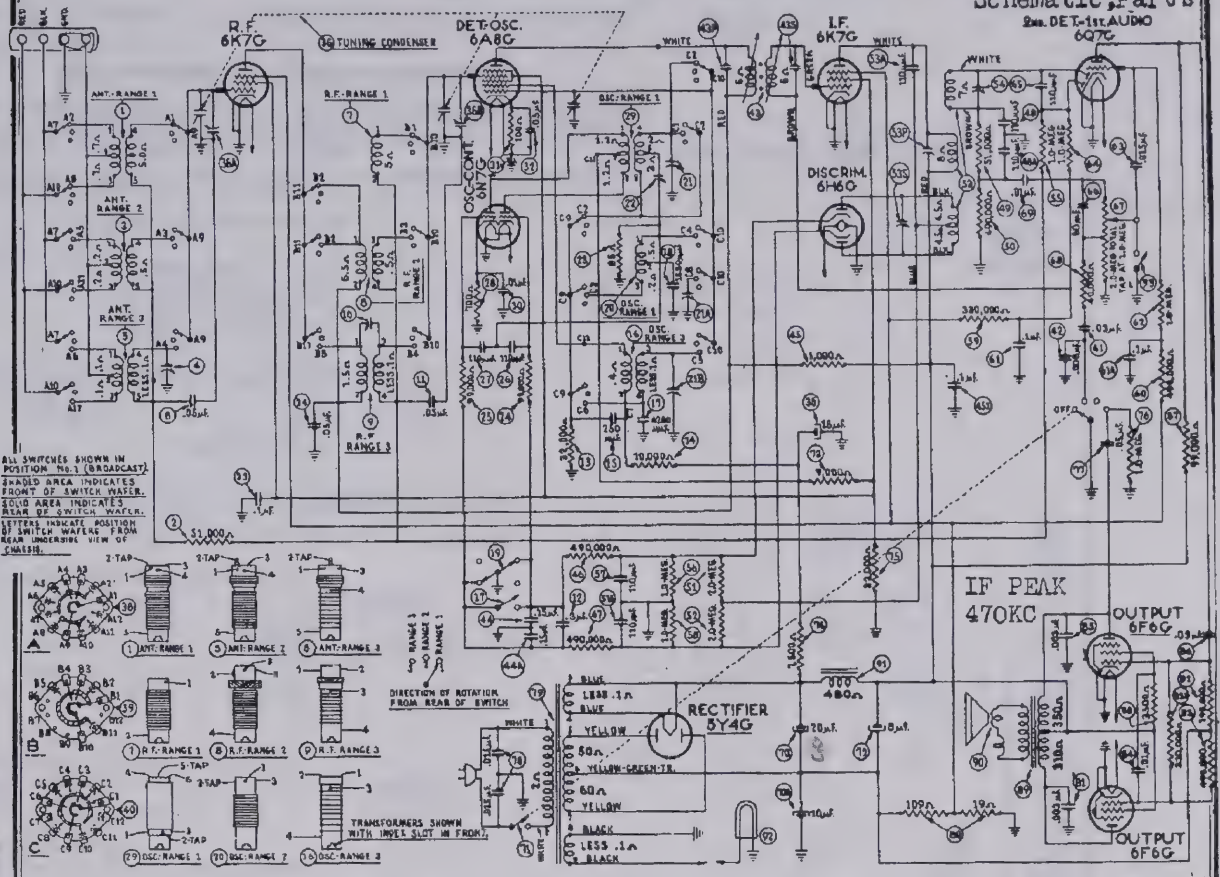
Courtesy Nostalgia Air

PHILCO RADIO & TELEV. CORP.

MODEL 37-9
Schematic, Parts


R.F. 6K7G
DET-OSC. 6A8G
I.F. 6K7G
2nd. DET-1st AUDIO 6Q7G
OSC-CONT. 6N7G
DISCRIM. 6H6G
TUNING CONDENSER
IF PEAK 470KC
OUTPUT 6F6G
OUTPUT 6F6G
RECTIFIER 5Y4G
ALL SWITCHES SHOWN IN POSITION NO. 1 (BROADCAST)
SHADED AREA INDICATES FRONT OF SWITCH WAFER.
SOLID AREA INDICATES REAR OF SWITCH WAFER.
LETTERS INDICATE POSITION OF SWITCH WAFERS FROM REAR UNDERSHOWN VIEW OF CHASSIS.
DIRECTION OF ROTATION FROM REAR OF SWITCH
TRANSFORMERS SHOWN WITH INVEE SLOT IN FRONT.

Schem. No.	Description	Part No.	List Price
1	Antenna Transformer (Range 1)	32-2378	$1.60
2	Resistor (51,000 ohms, ½ watt)	33-351339	.20
3	Antenna Transformer (Range 2)	32-2381	1.20
4	Compensator (Single)	31-6161	.30
5	Antenna Transformer (Range 3)	32-2384	1.20
6	Condenser (.05 mfd. tubular)	30-4444	.20
7	R. F. Transformer (Range 1)	32-2379	.40
8	R. F. Transformer (Range 2)	32-2382	1.00
9	R. F. Transformer (Range 3)	32-2385	1.20
10	Compensator (Single)	31-6160	.30
11	Condenser (.05 mfd. tubular)	30-4020	.20
12	Condenser (.15 double bakelite both sections used)	6287-DU	.40
13	Resistor (32,000 ohms, ½ watt)	33-332339	.20
14	Resistor (10,000 ohms, ½ watt)	33-310339	.20
15	Condenser (250 mmfd. mica)	30-1032	.25
16	Oscillator Transformer (Range 3)	32-2386	
17	Condenser (3500 mmfd.)	31-6156	.50
18	Condenser (1650 mmfd.)	31-6155	.40
19	Switch (Magnetic Tuning, manual)	42-1281	
20	Oscillator Transformer (Range 2)	32-2383	.70
21	Compensator (Three section)	31-6170	.75
22	Compensator (Osc. series)	31-6151	.40
23	Resistor (85 ohms, ½ watt)	33-085339	.20
24	Resistor (99,000 ohms, ½ watt)	33-399339	.20
25	Resistor (99,000 ohms, ½ watt)	33-399339	.20
26	Condenser (110 mmfd. mica)	30-1031	.20
27	Condenser (110 mmfd. mica)	30-1031	.20
28	Resistor (700 ohms, ½ watt)	33-170339	.20
29	Osc. Transformer (Range 1)	32-2373	1.60
30	Condenser (.01 mfd. tubular)	30-4479	.20
31	Resistor (100 ohms, ½ watt)	33-110339	.20
32	Condenser (.05 mfd. tubular)	30-4020	.20
33	Condenser (.1 mfd. tubular)	30-4455	
34	Condenser (.05 mfd. tubular)	30-4123	.20
35	Electrolytic Condenser (16 mfd.)	30-2118	1.65
36	Tuning Condenser	31-1953	4.00
37	Magnetic Tuning Switch (Automatic Dial)	45-2330	1.20
38	Range Switch (Ant.)	42-1282	.75
39	Range Switch (R. F.)	42-1283	.75
40	Range Switch (Osc.)	42-1284	
41	Condenser (.03 mfd. tubular)	30-4449	.20
42	Condenser (.006 mfd. tubular)	30-4445	.20
43	1st I. F Transformer	32-2449	2.20
44	Condenser (.15 dual bakelite)	6287-DG	.40
45	Resistor (1000 ohms, ½ watt)	33-210339	.20
46	Resistor (490,000 ohms, ½ watt)	33-449339	.20
47	Resistor (490,000 ohms, ½ watt)	33-449339	.20
48	Condenser (110 mmfd. dual bakelite)	8035-DG	.25
49	Resistor (51,000 ohms, ½ watt)	33-351339	.20
50	Resistor (490,000 ohms, ½ watt)	33-449339	.20
51	Resistor (2 megohm, ½ watt)	33-520339	$0.20
52	Resistor (2 megohm, ½ watt)	33-520339	.20
53	2nd I. F. Transformer (Discrim)	32-2376	3.30
54	Compensator	31-6147	.40
55	Resistor (1 megohm, ½ watt)	33-510339	.20
56	Resistor (1 megohm, ½ watt)	33-510339	.20
57	Condenser (110 mmfd. dual bakelite)	8035-DG	.25
58	Resistor (1 megohm, ½ watt)	33-510339	.20
59	Resistor (330,000 ohms, ½ watt)	33-433339	.20
60	Resistor (490,000 ohms, ½ watt)	33-449339	.20
61	Condenser (.1 mfd. dual bakelite)	4989-DG	.40
62	Resistor (1 megohm, ½ watt)	33-510339	.20
63	Condenser (.015 mfd. tubular)	30-4358	.20
64	Resistor (1 megohm, ½ watt)	33-510339	.20
65	Condenser (110 mmfd. mica)	30-1031	.20
66	Condenser (60 mfd. mica)	30-1040	.20
67	Volume Control	33-5158	1.00
68	Resistor (40,000 ohms, ½ watt)	33-340339	.20
69	Condenser (.01 mfd. tubular)	30-4479	.20
70	Electrolytic Condenser (10, 20 mfd.)	30-2183	2.00
71	Tone Control and A. C. Switch	42-1287	.75
72	Electrolytic Condenser (8 mfd.)	30-2024	1.10
73	Resistor (9,000 ohms, 2 watt)	33-290539	.30
74	Resistor (7,500 ohms, 3 watt)	33-275639	.30
75	Resistor (32,000 ohms, ½ watt)	33-332339	.20
76	Resistor (1 megohm, ½ watt)	33-510339	.20
77	Condenser (.05 mfd. bakelite)	8326-SU	.35
78	Condenser (.015 mfd. dual bakelite)	3793-DG	.40
79	Power Transformer (115 A. C., 50 to 60 cycles)	32-7606	6.25
	(115 A. C., 25 to 40 cycles)	32-7607	9.00
80	Resistor Bias (128 ohms)	33-3280	.30
81	Condenser (.003 mfd. tubular)	30-4469	.20
82	Resistor (199,000 ohms, ½ watt)	33-419339	.20
83X	Resistor (330,000 ohms, ½ watt)	33-433339	.20
83	Resistor (490,000 ohms, ½ watt)	33-449339	.20
84	Condenser (.01 mfd. tubular)	30-4169	.20
85	Condenser (.01 mfd. tubular)	30-4469	.20
86	Condenser (.03 mfd. bakelite)	8318-SU	.35
87	Resistor (99,000 ohms, ½ watt)	33-399339	.20
88	Resistor (3500 ohms, ½ watt)	33-235339	.20
89	Output Transformer (H-30)	32-7754	1.50
90	Cone and Voice Coil (H-30)	36-3801	1.20
91	Field Coil (H-30)	36-3687	4.00
92	Pilot Lamp	34-2039	.07
93	Ring and Arm Insulated (Audio shorting switch)	28-4110	.15
	Ring and Contact (Audio shorting switch)	45-2350	.15
	Washer Flat Fibre	27-8361	.01
	Washer Flat Fibre	27-8351	.01
	Collar Fibre	27-8389	

Description	Part No.	List Price
Automatic Dial (complete)	31-1960	$25.00
Brace	28-4119	.05
Cable (A. C.)	L-2183	.40
Cable (speaker)	41-3258	.50
Coupling (Tuning Condenser)	31-1951	.80
Coupling (Range Switch)	28-7198	.15
Clip (Volume Shaft)	28-4394	.01
Control Screws (Station Index)	31-1898	.15
Dial	27-5283	
Dial Escutcheon Assembly	45-2324	.40
Gear "Front" (Dial Assembly)	45-2347	.60
Gear "Rear" (Dial Assembly)	45-2348	.60
Guide (Mask)	28-4118	.25
Handle (Dial)	45-2382	.50
Hub Assembly (Handle)	45-2344	.50
Housing (Control Screws)	28-7196	1.00
Mask and Link Assembly	45-2401	
Plate (Drive Mtg. Assembly)	45-2349	
Pilot Lamp Assembly	38-7706	.35
Reflector Ring	28-4630	.25
Ring (Retaining Mask Assembly)	28-7195	.20
Rubber (Chassis Mtg.)	27-4116	.08
Rubber Spacer (Chassis Mtg.)	27-4360	.04
Screen Holder Assembly	31-1968	
Shield (Chassis Bottom)	28-4626	.30
Shield (Tube—Square)	28-2726	.10
Shield (Tube—Round)	8005	.10
Shaft (Volume Control)	38-8285	
Shaft and Plate (Range Switch)	42-1287	.50
Spring (Volume Shaft)	28-4117	.40
Socket (7 prong)	27-6057	.11
Socket (8 prong)	27-6058	.11
Socket (Rectifier)	27-6052	.11
Spacer (Wood)	27-2116	.05
Terminal Panel (Ant.)	38-7714	.15
Vernier Drive	45-2342	2.40
Washer (Dial Scale)	27-8398	.01

CABINET PARTS

Baffle Speaker	16304	
Bezel Assembly	40-5980	
Bezel Gasket	27-8517	.05
Plate (Fibre)	27-7497	.01
Silk	44-1190	
Speaker H-30	36-1295	
Washer	28-2089	.50
Knob (Range Switch)	27-4328	.10
Knob (Tuning)	27-4330	.10
Knob (Tuning Vernier)	27-4331	.10
Knob (Tone and Volume)	27-4332	.10

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Courtesy Nostalgic Air

MODEL 37-9
Alignment, Voltage
Chassis, Trimmers

PHILCO RADIO & TELEV. CORP.

Alignment of Compensators

EQUIPMENT REQUIRED: (1) Signal Generator; **Philco Model 089** (fundamental frequency 110 to 20,000 K. C.) is the correct instrument for this purpose; (2) Output meter; **Philco Model 025** Circuit Tester incorporates a sensitive output meter and is recommended; (3) Fibre handle screw-driver (Philco Part No. 27-7099); (4) Special variable condenser (Philco Part No. 45-2325).

OUTPUT METER: The 025 Output Meter is connected to the plate and cathode terminals of one of the (6F6G) tubes. Adjust the meter to use the (0-30) volt scale.

INTERMEDIATE FREQUENCY CIRCUIT

1. Set controls as follows:

a. Magnetic Tuning "off" (19)
b. Bass compensation minimum
c. Volume control maximum (67)
d. Receiver Dial 580 K. C.
e. Signal Generator 470 K. C.
f. Range switch position 1

2. Adjust the I. F. compensators for maximum with signal generator output lead connected through a .1 mfd. condenser to the grid of the tubes as follows:

Input Point	Compensators in Order
6A8G—1st Det.	(54) (53P) (43S) (43P)

RADIO FREQUENCY CIRCUIT

Tuning Range 530 to 1720 K. C.

1. Connect the signal generator output lead through a .1 mfd. condenser to terminal 1 and the generator ground to terminal 3 on aerial input panel. Terminals 2 and 3 must be connected with the shorting link provided on the aerial panel.

2. Other controls set as given under intermediate frequency circuit, with the exception of those as follows:

Adjust compensators for maximum output as follows:

Range Switch	Signal Generator	Receiver Dial	Compensators in Order
1	1600 K. C.	1600 K. C.	(21) (36B) (36A)
1	580 K. C.	580 K. C.	(22) Roll gang through signal when padding this compensator
1	1600 K. C.	1600 K. C.	(21)
1	1500 K. C.	1500 K. C.	(36A) (36B)

Tuning Range 2.3 to 7.4 M. C.

Adjust compensators for maximum output as follows:

Range Switch	Signal Generator	Receiver Dial	Compensators in Order
2	6 M. C.	6 M. C.	(21A)

Tuning Range 7.35 to 22 M. C.

Adjust compensators for maximum output as follows:

Range Switch	Signal Generator	Receiver Dial	Compensators in Order
3	18 M. C.	18 M. C.	(21B) Check image at 17.06 M. C.
3	18 M. C.	18 M. C.	(10) (4) Use shunt condenser on (21B) or rock gang through signal when padding compensator No. 10
3	18 M. C.	18 M. C.	(21B)

MAGNETIC TUNING ADJUSTMENT—Set the range switch in position one (530 to 1720 K. C.) and the magnetic tuning switch in the "out" position. Now turn the signal generator and receiver dial to any frequency in the Broadcast band. The receiver dial must be adjusted very accurately for maximum output.

Set the magnetic tuning control in the "on" position (clockwise). Compensator (53S) of the magnetic tuning transformer is now adjusted for maximum output.

The above adjustment is now checked for accuracy, by turning the magnetic tuning control "off" and "on." When this is done, there should be no change in the tone of the received signal. If a change of tone or hiss develops, it indicates a shift in frequency and the adjustment must be made again.

Electrical Specifications

Power Supply: Voltage	Frequency Cycles	Consumption
115	50 to 60	110 watts
115	25 to 40	110 watts

Intermediate Frequency: 470 K. C.

Undistorted Output: 5 watts.

Tone Control: 3 positions.

Speaker: H-30.

December, 1936

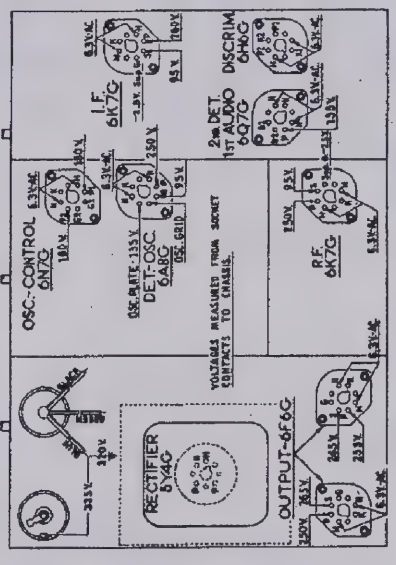

Fig. 1—Receiver Socket Voltages

The voltages indicated by arrows were measured with a Philco 025 Circuit Tester which contains a voltmeter having a resistance of 1000 ohms per volt. Volume Control at minimum, range switch in broadcast position, line voltage 115 A. C.

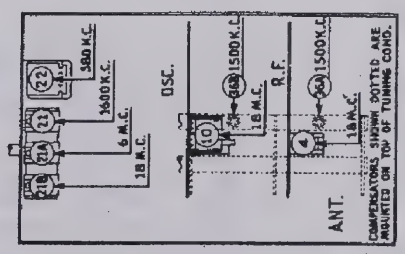

Fig. 3—R. F. Compensators

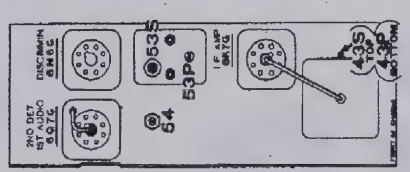

Fig. 2—I. F. Compensators

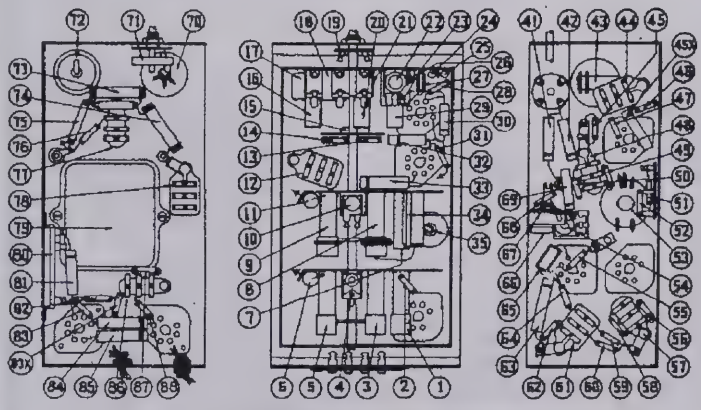

Fig. 4—Part Locations, Underside of Chassis

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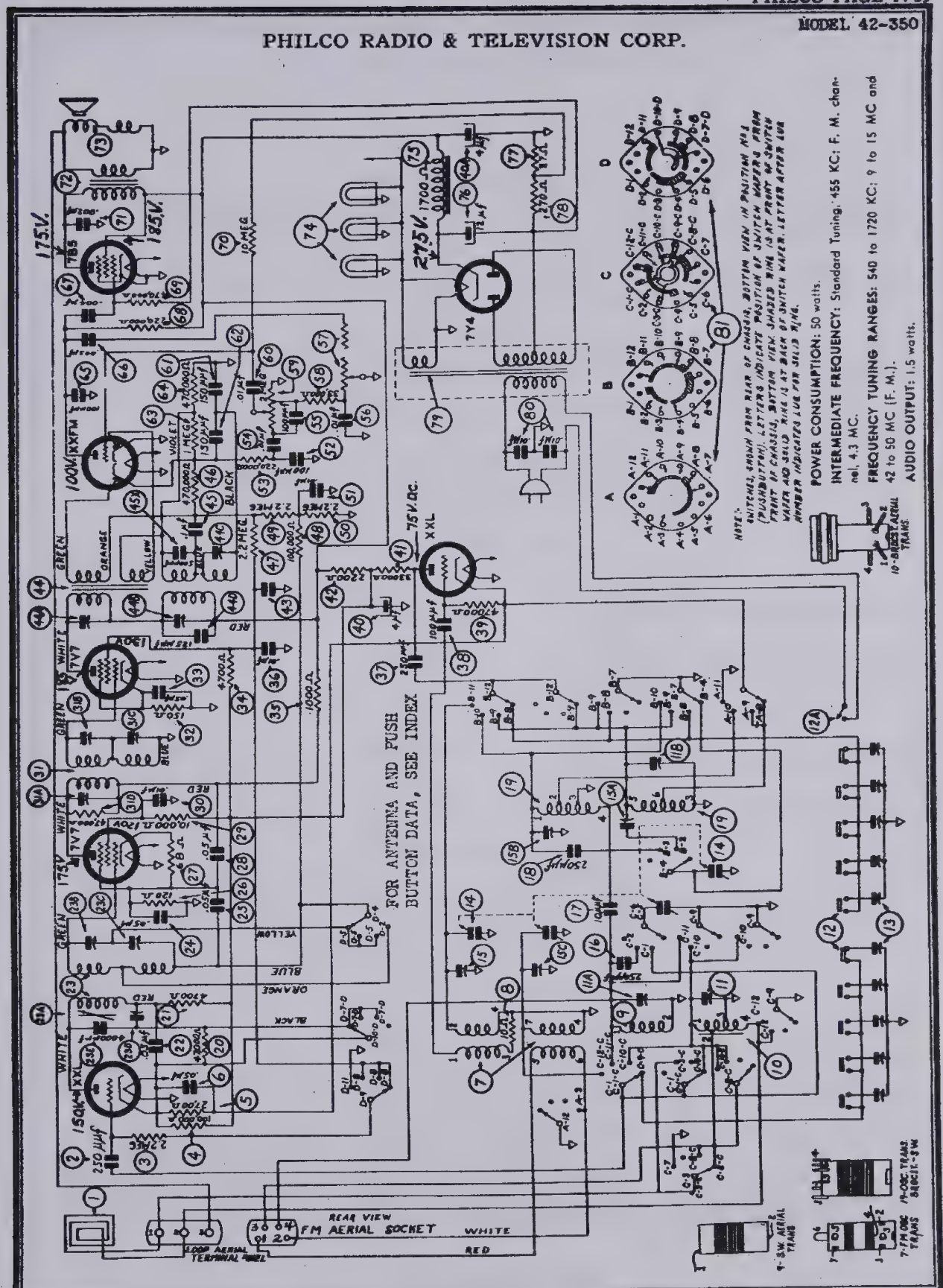
MODEL 42-350

PHILCO RADIO & TELEVISION CORP.



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Courtesy Nostalgia Air

MODEL 42-350

PHILCO RADIO & TELEVISION CORP.

CONNECTING ALIGNING INSTRUMENTS

AUDIO OUTPUT METER: Terminal No. 3 is provided on the loop aerial panel for connecting one lead of the audio output meter to the voice coil of the speaker. The other lead of the meter is connected to the chassis. When using these connections, the lowest A. C. scale of the meter must be used. (0 to 10 volts.)
The audio output meter can also be connected between the plate of the output tube and the chassis.

SIGNAL GENERATOR: When adjusting the "I. F." padders, the high side of the signal generator is connected through a .1 mfd. condenser to the points indicated in signal generator column "output connections" to receiver in the tabulations below.

When aligning the R. F. padders a loop is made from a few turns of wire and connected to the signal generator output terminals; the loop is then placed two or three feet from the loop in the cabinet and dipole aerial lead. Do not remove the receiving loops from the cabinet. It is necessary when adjusting the padders, that the receiver be left in the cabinet.

After connecting the aligning instruments adjust the compensators in the order shown in the tabulation below. Location of the compensators are shown in Fig. 1. If the output meter pointer goes off scale when adjusting the compensators, reduce the strength of the signal from the generator.

STANDARD AND S. W. BANDS ALIGNING PROCEDURE

	SIGNAL GENERATOR			RECEIVER		
Operations In Order	Output Connections	Dial Setting	Dial Setting	Control Settings	Adjust Compensators in Order	Special Instructions
1	High side to No. 1 terminal loop panel	455 KC	580 KC	Vol. max. Band Switch "Brdcst."	44B, 31C, 23A, 23B	
2	Use loop on generator	1500 KC	1500 KC	"	15A, 11B	Note A
3	Use loop on generator	580 KC	580 KC	"	11	Roll Tuning Condensers Note B
4	Use loop on generator	Readjust as given in Operation 2				
5	Use loop on generator	15 MC	15 MC	Band Switch "S.W."	15B, 11A	Note C

FREQUENCY MODULATION ALIGNING PROCEDURE

Note: The Frequency Modulation Circuits Must Be Adjusted With the Dipole Aerial Connected

CRITICAL WIRING LOCATIONS

The following items on this set are critical for location and position. See Figs. 4 and 5, for locations of wires and parts.

Note 1. Dipole aerial leads from socket to be twisted and dressed over wave switch directly to F. M. aerial-oscillator transformer No. 7.

2. Ground braid from gang to chassis to be wired and soldered on top side of subbase in such a manner so that there is a floating bond between ground and the condenser.

3. Short wave aerial transformer (No. 9) to be wired directly between terminal panel 4 and band switch contact C-11-C so that there is a minimum of slack in the wires.

4. Wire from broadcast aerial transformer (No. 10) to ground to be dressed under short wave aerial transformer (No. 9).

5. Wire from band switch contact B-11 to compensator 15 to be direct and away from switch and other wires.

6. Red and white wires from 1st I. F. transformer to be dressed on base and not twisted with other wires from same coil. Green wire to be free of other wires and direct to contact 6 of the 7V7, 1st I. F. tube.

7. Wires from 3rd I. F. transformer (44) to be brought out proper holes and not twisted together inside of can.

8. Green and yellow wires of 3rd I. F. transformer 44 to run from hole in subbase between terminal panel 5, contacts 2 and 3 and direct to contacts of the XXFM tube 5 and 6. Orange, blue, black and brown leads to be free of other wires and dressed off base.

9. Condenser (45) to be dressed off base.

10. A.C. switch leads to be twisted.

11. Wire from prong 5 of the 7Y4 tube to lug 3 of the loop aerial terminal panel to be dressed between Electrolytic Condenser 76 and Mounting Strap and to rear of chassis across bottom contacts of F. M. socket.

12. White, red and black wires of 1st I. F. transformer to be dressed with excess out of coil shield, and towards rear of chassis, and close to base. Black lead to be dressed around and under all leads going to XXL converter tube socket. Orange, yellow, green and blue leads to be dressed with excess out of coil shield and away from the white, red and black leads.

13. Wire from bond switch contact C-12-C to compensator 15-C to be dressed free of other wires.

14. Dress wire from band switch contact B-12 to wiring panel 4, lug 4 with excess toward front of set, under shortwave aerial transformer (9), keeping wire between the terminal panel 4 and wires coming through subbase which connect to F. M. aerial-oscillator transformer (7) and band switch.

15. Keep wires from terminal panel No. 5 contact No. 5 to band switch contact D8 and terminal panel No. 6 to terminal panel No. 4 between padder strip and mounting stud of 1st I. F. transformer so that they are kept clear of leads from the 1st I. F. transformer.

F. M. BAND ALIGNING PROCEDURE

	SIGNAL GENERATOR			RECEIVER		
Operations In Order	Output Connections	Dial Setting	Dial Setting	Control Settings	Adjust Compensators in Order	Special Instructions
1	2nd I. F., F. M. input connection	4.3 MC	580 KC	Vol. max. Band Switch "F.M."	44C (Note D) 44A (Note E)	
2	1st I. F., F. M. input connection	4.3 MC	580 KC	Band Switch "F.M."	31A, 31B (Note F)	
3	High side to No. 1 contact, F. M. socket, Ground to No. 2 contact	4.3 MC	580 KC	Band Switch "F.M."	23D, 23C (Note F)	
4	Use test loop on generator; place near dipole aerial	48.5 MC	85 (Note G)	Band Switch "F.M."	15 (Note G) 15C (Note H)	Roll tuning condenser when adjusting 15C. See Note B.
5	"	48.5 MC	85	Band Switch "F.M."	15 oscillator	

NOTE A.—DIAL CALIBRATION: In order to adjust the receiver correctly, the dial pointer must be aligned to track properly with the tuning condenser. To adjust the dial, proceed as follows: With the tuning condenser closed (maximum capacity) set the dial pointer on the extreme left index line at the low frequency end of the broadcast scale.

NOTE B.—When adjusting the low frequency compensator of the broadcast or the aerial padders of the high frequency tuning range; the receiver tuning condenser must be adjusted (rolled) as follows: First, tune the compensator for maximum output, then vary the tuning condenser of the receiver for maximum output. Now turn the compensator slightly to the right or left and again vary the receiver tuning condenser for maximum output. This procedure of first setting the compensator and then varying the tuning condenser is continued until maximum output reading is obtained.

NOTE C.—Adjust compensator (15B) to the second signal peak from the closed position (maximum capacity). The aerial compensator (11A) must also be adjusted to maximum on the first signal peak by rolling the tuning condenser. (See Note B.)

NOTE D.—With the signal generator set to 4.3 MC, padder (44C) is adjusted to the point where minimum signal indication is observed on the output meter.

NOTE E.—Turn the signal generator first to approximately 125 KC below 4.3 MC (4.17 MC) and then 125 KC above 4.3 MC (4.43 MC). A signal peak should be observed on the output meter at approximately each of these points (4.17 and 4.43). The two peak signals should be of equal reading on the output meter and equally spaced in frequency each side of 4.3 MC. If the peaks are unequal in amplitude, padder (44A) must be adjusted in the direction necessary to make both peaks equal. This is done by slightly turning padder and then turning signal generator above and below 4.3 to observe peaks. After equal peaks readings are obtained, set the signal generator to 4.3 MC. The output meter should show zero reading at 4.3 MC. If a signal indication is observed readjust padder (44C) until zero reading is obtained on the meter. After this adjustment is made padder No. 44A should be reset for equal peaks as given above.

NOTE F.—Adjust padders 31A, 31B, 23C, and 23D for equal signal peaks and equal frequency spacing each side of 4.3 M.C.

NOTE G.—The dial scale numbers are listed in tenths of megacycles less the first digit; i. e., 49 MC is 90, 48.5 is 85. Set the tuning dial pointer to 90 on the F. M. scale. Adjust padder (15) to the point where minimum signal indication is observed on the output meter.

NOTE H.—In order to adjust padder (15C) the signal generator should be set to either the signal peak approximately 125 KC below 49 MC (48.875 MC), or 125 KC above 49 MC (49.125 MC). Adjust padder (15C) to maximum output reading on either of these peak signals. As padder 15C is being adjusted roll the tuning condenser as given in Note B.

SEE INDEX FOR CHANGES

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Courtesy Nostalgia Air

MODEL 42-350

PHILCO RADIO & TELEVISION CORP.

REPLACEMENT PARTS—Model L42-350, Code 121

Schem. No.	Description	Part No.
1.	Loop Aerial	76-1383
	Mtg. Screw	W-2071
1a.	F.M. Loop Aerial	76-1303
	Socket	27-6181
2.	Mica Condenser (250 mmfd.)	60-125257
3.	Resistor (2.2 megohms)	33-522339
4.	Resistor (100,000 ohms)	33-410339
5.	Resistor (2700 ohms)	33-227339
6.	Condenser (.05 mfd., 200 volts)	30-4519
7.	F.M. Oscillator Transformer	32-3797
	Mtg. Clip	26-5002
8.	Resistor (10 ohms)	33-810336
9.	Short Wave Aerial Transformer	32-3764
10.	Broadcast Aerial Transformer	32-3763
	Mtg. Clip	26-5002
11.	Compensator (Brdcst. Band, 580 K.C.)	31-6428
11a.	Compensator (S.W. Aerial, 15 M.C.) Part of 11	
11b.	Compensator (Brdcst. Band, 1500 K.C.) Part of 11	
12.	Push-button Switch & A.C. Switch	42-1695
12a.	A.C. Switch (Part of 12)	
	Mtg. Sleeve	26-5665
	Mtg. Screw	W-523
13.	Push-button Padder Strip	31-6372
	Mtg. Screw	W-1974
14.	Tuning Condenser	31-2595
	Drive Cord (Tuning Cond.)	31-2546
	Spring	28-8751
	Drive Cord (Pointer)	31-2584
	Spring	26-4953
	Mtg. Rubber	27-4596
	Mtg. Sleeve	26-3896
	Mtg. Washer	W-151
	Mtg. Screw	W-2002
	Tuning Shaft	56-6156
	Tuning Drive Drum	38-9883
15.	Compensator (F.M. Osc., 44.5 M.C.)	31-6444
15a.	Compensator (Brdcst. Osc., 1500 K.C.) Part of 15	
15b.	Compensator (S.W. Osc., 15 M.C.) Part of 15	
15c.	Compensator (F.M. Aerial, 43.5 M.C.) Part of 15	
16.	Silver Mica Condenser (250 mmfd.)	20-025011
17.	Mica Condenser (10 mmfd.)	60-010337
18.	Mica Condenser (250 mmfd.)	20-025011
19.	Oscillator Transformer (Brdcst., S.W.)	32-3798
	Mtg. Clip	26-5003
20.	Resistor (47,000 ohms)	33-347339
21.	Resistor (4700 ohms)	33-247339
22.	Condenser (.05 mfd., 400 volts)	30-4518
23.	1st I.F. Transformer	32-3784
	Mtg. Nut	W-1949
23a.	Primary Compensator (455 K.C.) Part of 23	
23b.	Secondary Compensator (455 K.C.) Part of 23	
23c.	Secondary Compensator (4.3 M.C.) Part of 23	
23d.	Primary Compensator (4.3 M.C.) Part of 23	
23e.	Mica Condenser (4800 mmfd.) (Part of 23)	60-248214
24.	Condenser (.05 mfd., 200 volts)	30-4519
25.	Condenser (.05 mfd., 200 volts)	30-4519
26.	Resistor (120 ohms)	33-112336
27.	Resistor (68 ohms)	33-068336
28.	Condenser (.05 mfd., 400 volts)	30-4518
29.	Resistor (10,000 ohms)	33-310339
30.	Condenser (.01 mfd., 400 volts)	30-4572
31.	2nd I.F. Transformer	32-3785
	Mtg. Nut	W-1949
31a.	Primary Compensator (4.3 M.C.) Part of 31	
31b.	Secondary Compensator (4.3 M.C.) Part of 31	
31c.	Secondary Compensator (455 K.C.) Part of 31	
31d.	Resistor (47,000 ohms) (Part of 31)	33-347339
32.	Resistor (150 ohms)	33-115336
33.	Condenser (.05 mfd., 200 volts)	30-4519
34.	Resistor (4700 ohms)	33-247339
35.	Resistor (1000 ohms)	33-210339
36.	Condenser (.01 mfd., 400 volts)	30-4572
37.	Mica Condenser (250 mmfd.)	60-125257
38.	Mica Condenser (100 mmfd.)	60-110257
39.	Resistor (47,000 ohms)	33-347339
40.	Electrolytic Condenser (4-4 mfd., 400 volts)	30-2477
40a.	Electrolytic Condenser (4 mfd., 400 volts) (Part of 40)	
	Mtg. Clip	56-1466
41.	Resistor (33,000 ohms)	33-333339
42.	Resistor (2200 ohms)	33-222339
43.	Condenser (.4 mfd., 200 volts)	30-4518
44.	3rd I.F. Transformer	32-3796
	Mtg. Nut	W-1949
44a.	Primary Compensator (4.3 M.C.) Part of 44	
44b.	Primary Compensator (455 K.C.) Part of 44	
44c.	Secondary Compensator (4.3 M.C.) Part of 44	
44d.	Mica Condenser (125 mmfd.) Part of 44	
45.	Condenser (.1 mfd.)	30-4585
45a.	Mica Condenser (500 mfd.)	60-150227
46.	Resistor (470,000 ohms)	33-447339
47.	Resistor (2.2 megohms)	33-522339
48.	Resistor (100,000 ohms)	33-410339
49.	Resistor (2.2 megohms)	33-522339
50.	Resistor (2.2 megohms)	33-522339
51.	Condenser (.01 mfd., 400 volts)	30-4572
52.	Mica Condenser (100 mmfd.)	60-110257
53.	Resistor (220,000 ohms)	33-422339
54.	Condenser (.01 mfd., 400 volts)	30-4572
55.	Mica Condenser (100 mmfd.)	60-110257
56.	Condenser (.01 mfd., 400 volts)	30-4572
57.	Tone Control	33-5471
	Mtg. Nut	W-2157
58.	Resistor (33,000 ohms)	33-333339
59.	Volume Control	33-5370
	Mtg. Nut	W-2157
60.	Condenser (.01 mfd., 400 volts)	30-4572
61.	Mica Condenser (150 mmfd.)	60-115327
62.	Mica Condenser (150 mmfd.)	60-115327
63.	Resistor (1 megohm)	33-510339
64.	Resistor (470,000 ohms)	33-447339
65.	Mica Condenser (100 mmfd.)	60-110257
66.	Condenser (.003 mfd., 1000 volts)	30-4469
67.	Condenser (.004 mfd.,)	30-4623
68.	Resistor (220,000 ohms)	33-422339
69.	Resistor (470,000 ohms)	33-447339
70.	Resistor (10 megohms)	33-610339
71.	Condenser (.002 mfd., 500 volts)	30-4622
72.	Output Transformer	32-3772
73.	Speaker	36-1548
	Cone Assembly (for Speaker 36-1548)	36-4206
	Cable	41-3613
74.	Dial and Indicator Lamps	34-2054
75.	Field Coil (Replace Speaker 36-1548)	
76.	Electrolytic Condenser (12mfd., 400 volts)	30-2480
	Mtg. Clip	56-1466
77.	Resistor (27 ohms)	33-027338
78.	Resistor (270 ohms)	33-127438
79.	Power Transformer (115 volts, 60 cycle)	32-8483
	Mtg. Screw	W-453
	Shield	56-2285
	Shield Base	56-2286
	Power Transformer (115 volts, 25 cycles)	32-8210
	Shield	56-1547
	Shield Base	56-1548
	Power Transformer 115/230 volts, 60 cycle)	32-8211
80.	Condenser (.01-.01 mfd.)	3003-DDC
81.	Band Switch	42-1696
	Mtg. Nut	W-2157
	MISCELLANEOUS PARTS	
	Arm and Link (Band Indicator)	76-1353
	Cable (Power)	L-3188
	Cabinet	18562A
	Dial Scale	27-5786
	Dial Pointer	56-1886
	Escutcheon (Push Buttons)	56-2233
	Mtg. Screw	W-2071
	Knob Assembly (Vol. Tone, Band)	54-4102
	Knob Assembly (Push Buttons)	54-4125
	Mtg. Screw (Chassis)	W-763
	Mtg. Washer (Chassis)	W-425
	Socket Assembly (Indicator Lamps)	76-1807
	Socket Assembly (Dial Lamps)	76-1287
	Socket (Single Prong)	27-6180
	Socket (Tubes)	27-6177
	Socket (4 Prong F.M. Aerial)	27-6181
	Mtg. Rivets	W-238
	Tab Kit	40-6000
	Tab (Television)	27-5776
	Terminal Panel (Loop)	38-9882
	Wiring Panel (8 lugs)	38-9887
	Wiring Panel (5 lugs)	38-9879
	Mtg. Rivets	W-238

POWER SUPPLY: 115 volts, 60 cycles A.C. This model can also be operated on 25-cycle current. To do this it is necessary to replace the power transformer as indicated in the parts list for 25-cycle operation.

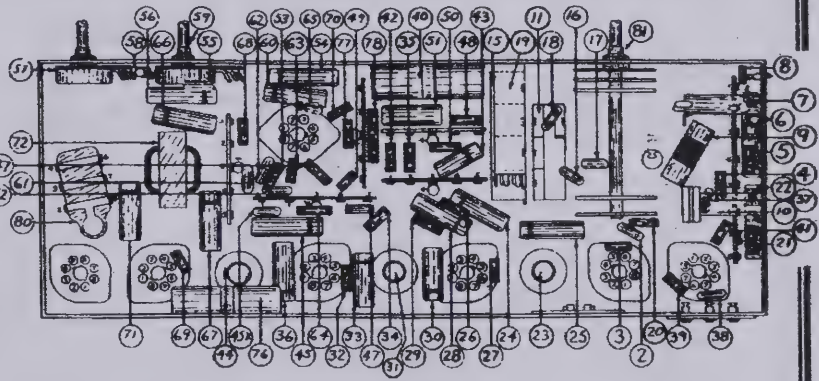

FIG. 4—LOCATIONS OF PARTS—UNDER CHASSIS

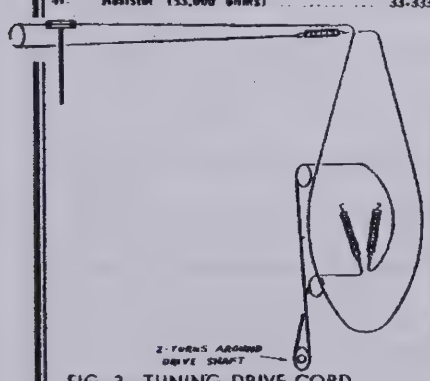

FIG. 3—TUNING DRIVE CORD ARRANGEMENT

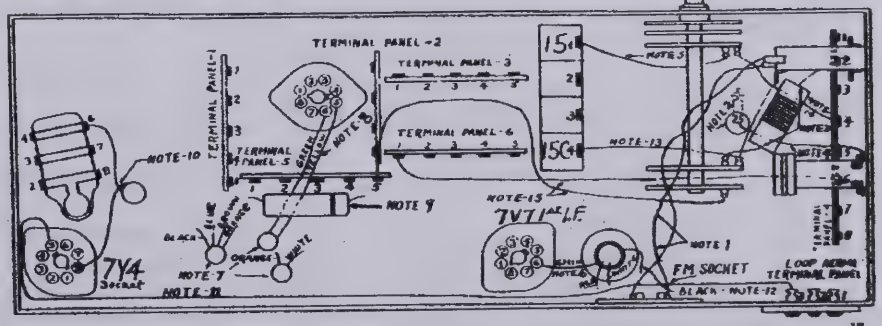

FIG. 5—CRITICAL WIRING AND PART LOCATIONS—UNDER CHASSIS (See Notes 1 to 15.

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Courtesy Nostalgia Air

MODEL 42-322
MODEL 42-350

PHILCO RADIO & TELEVISION CORP.

MODEL 42-322 ALIGNMENT

Signal Generator: When adjusting the I. F. padders, the high side of the signal generator is connected through a .1 mfd. condenser to the antenna section of the tuning condenser. Connect the ground or low side of the generator to the chassis.
When aligning the R. F. padders a loop is made from a few turns of wire and connected to the signal generator output terminals; the signal generator is then placed close to the loop of the radio.

The receiver can be adjusted in the cabinet or removd from the cabinet. When adjusting the R. F. Compensators in the cabinet, the aligning points on the dial scale are used. If the radio is adjusted outside of the cabinet, the small indentations (lines) on the dial metal background plate mounted on the chassis are used as aligning points. These points progressing from the left end of the scale plate represent frequencies as follows: pointer position with tuning condenser closed, 520 K.C., 9.5 M.C., 1500 K.C., 15 M.C., and the last line 1720 K.C. or 15.5 M.C.
When adjusting the radio outside the cabinet the loop aerial should be placed in approximately the same position around or near the chassis as when assembled.

Operations in Order	SIGNAL GENERATOR		RECEIVER			SPECIAL INSTRUCTIONS
	Output Connections to Receiver	Dial Setting	Dial Setting	Control Setting	Adjust Compensators in Order	
1	Lug on the Ant. Section of Tuning	455 K.C.	540 K.C. Tuning Cond. Closed	Vol. Max. Range Switch Brdcst.	27A, 27B 26A, 26B	
2	Loop See Above Instructions	1500 K.C.	1500 K.C.	Vol. Max. Band Switch Brdcst.	7B, 7A	Note A
3	Loop See Above Instructions	580 K.C.	580 K.C.	Vol. Max. Band Switch Brdcst.	(18)	Roll Tuning Condenser
4	Loop See Above Instructions	Repeat Operation 2				
5	Loop See Above Instructions	15 M.C.	15 M.C.	Band Switch S.W.	(18A, 5) Note B	Roll Tuning Condenser When Padding 5

NOTE A—DIAL POINTER CALIBRATION: In order to adjust the receiver correctly, the pointer must be adjusted to track properly with the tuning condenser. To do this, turn the tuning condenser to the maximum capacity (plates fully meshed). With the condenser in this position, set the tuning pointer on the first small line stamped in the scale plate on the left side.

NOTE B—To accurately adjust the high frequency oscillator compensator to the fundamental instead of the image signal, turn the oscillator compensator (18A) to the maximum capacity position (clockwise). From this position slowly turn the compensator counter-clockwise until a second peak is obtained on the output meter. Adjust the compensator for maximum output at this second peak.

If the above procedure is correctly performed, the image signal will be found (much weaker) by turning the signal generator dial 910 K.C. above the frequency being used on any high frequency range.

The aerial padder (5) must be adjusted to maximum by rolling the tuning condenser. If two signal peaks occur when turning the padder, adjust to maximum output on the first signal peak from the tight position (screw all the way down) of the padder.

-Model L42-350, Code 121

EXTERNAL AERIAL CONNECTIONS

The built-in aerial system is designed to operate without an outside aerial or ground and to give exceptionally high receiving performance of stations in the standard, shortwave, or FM bands.

To operate the radio in steel reinforced buildings and other shielded locations where signal strength is weak, an external aerial is recommended. Three different types of aerial combinations are available, to improve reception on the the standard, short-wave, or FM bands.

1—For Additional Sensitivity on Frequency Modulation only:

*Philco Dipole Outdoor Aerial, Part No. 45-2926.

The plug at the end of the transmission line is inserted in the socket at the back of the chassis in place of the plug connected to the F. M. loop in the cabinet.

2—For Additional Sensitivity on ALL ranges:

*Philco Dipole Outdoor Aerial, Part No. 45-2926.

Philco Aerial Coupler, Part No. 45-1361.

The coupler plugs into the socket at the back of the chassis in place of the plug connected to the F. M. loop. The aerial transmission line then connects to the terminals on the coupler marked "red" and "black." The local-distance switch on the coupler connects or disconnects the outdoor aerial from the standard broadcast and shortwave tuning ranges. The dipole remains connected to the F. M. band regardless of the position of the switch.

3—For Additional Sensitivity on Standard Broadcast and Shortwave only In Areas where F. M. reception is not available.

Philco Safety Aerial, Part No. 40-6370.

Philco Aerial Coupler, Part No. 45-1361.

Connect the single wire lead in of the aerial to the "black" terminal on the aerial coupler.

*Accessories for this aerial are the Philco Aerial Mast Kit, the Philco Reflector Kit and Philco High Efficiency Transmission Line. See Service Bulletin No. 296 on Dipole Aerials.

NOTE: When installing the F. M. Philco Outdoor Dipole Aerial, it is very important that the aerial compensating condensers of the standard and shortwave band are repadded.

ELECTRIC PUSH-BUTTON TUNING ADJUSTMENTS

The electric push-button tuning mechanism consists of six (6) push-buttons. Five of the push-buttons are used for selecting standard broadcast stations, and one for the power control (ON-OFF).

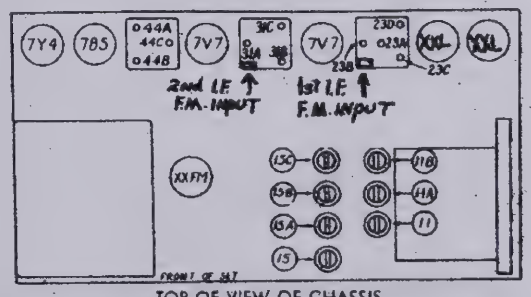
Viewing the front of the cabinet from left to right the first push-button is the power control (ON-OFF), the next five push-buttons for tuning standard broadcast stations.

When setting up stations on the push-buttons the lowest frequency station is set up in the second push-button from the left and and the remaining stations according to increasing frequency in the next four push-buttons. These push-buttons are adjusted by the padders located on the rear of the chassis.

The frequency ranges covered by the station tuning push-buttons and procedure for adjusting are as follows:

Padders (right to left from rear)	Circuit	Buttons (left to right from front)	Frequency Range
1	Ant.	1	ON-OFF
2	Osc.	2	540 to 980 KC
3	Ant.	3	540 to 980 KC
4	Osc.		
5	Ant.	4	710 to 1185 KC
6	Osc.		
7	Ant.	5	880 to 1480 KC
8	Osc.		
9	Ant.	6	1185 to 1720 KC
10	Osc.		

The second push-button from the left can also be adjusted for reception of the sound channel of a television program received by special Philco television radios. This push-button may also be used in conjunction with a Philco Wireless Record Player.



TOP OF VIEW OF CHASSIS

FIG. 1—LOCATIONS OF R. F. AND I. F. COMPENSATORS

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Courtesy Nostalgia Air

PHILCO
MODELS 46-420, 46-420-I

PHILCO
MODELS 46-420, 46-420-I

PHILCO MODELS 46-420

TRADE NAME	Philco Models 46-420, 46-420-I
MANUFACTURER	Philco Corp., Tioga & C Streets, Philadelphia, Pa.
TYPE SET	AC - DC Superheterodyne - Self Contained Loop Antenna
TUBES (SIX)	Types, 7C7 RF Amp., 7A8 Converter, 7B7 IF Amp., 7C6 Det.-AVC-AF, 50L6GT Power Output, 35Z5GT Rectifier.
POWER SUPPLY	105-125 Volts AC-DC
TUNING RANGE—BROADCAST	540-1620KC RATING .230 Amps. @ 117V AC

ALIGNMENT INSTRUCTIONS

After IF alignment is completed, remount chassis in cabinet, reconnect loop leads and then adjust A5 & A6. To set dial pointer close tuning condenser to fully meshed position and set the dial pointer at the circular dot at the extreme low frequency end of the dial. Use isolating transformer if available. If not, connect capacitor in series with low side of signal generator to B-. Volume control at maximum volume position and output from signal generator no higher than is necessary to obtain output reading. Use insulated alignment screwdriver for adjusting.

DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
.05 MFD.	High side to stator plate terminal of tuning condenser. Low side to B-.	455KC	Low freq.end of dial.(Variable fully closed)	Across voice coil (Lugs on terminal strip at rear of chassis)	A1,A2, A3,A4.	Turn A4 down tight. Adjust trimmer for maximum output in given order including A4. If isolation transformer is not used, reduce dummy ant. to .001 MFD to reduce excessive hum modulation.
.05 MFD.	"	1600KC	1600KC	"	A5	Adjust for maximum output.
100 MMF.	High side to external ant. lead Low side to chassis.	1500KC	Tune for maximum output.	"	A6	" " " "

HOWARD W. SAMS & CO., INC. • 2924 East Washington Street • Indianapolis 6, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
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PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	7C7	7C7	8V	
2	Converter	7A8	7A8	8U	
3	IF Amp.	7B7	7B7	8V	
4	Det.-AVC-AF	7C8	7C6	8W	
5	Power Output	50L6GT	50L6GT	7AC	
6	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: PHILCO PART No.	MALLORY PART No.	SOLAR PART No.	SPRAGUE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
7A	20	150	30-2547	2N509	DHN-2x20-150	TA-220	PRSA150-20-20	EZ2215	Filter - Red
B	20	150							" - Orange
8	.04	400	30-4119	TP425	S-4-04	TC-14	484-04	DT4S4	Line Filter
9	.02	400	30-4599	TP423	S-4-02	TC-12	484-02	DT4S2	50L6 Plate Bypass
10	.01	400	61-0120	TP421	S-4-01	TC-11	484-01	DT4S1	Audio Coupling
11	.01	400	61-0120	TP421	S-4-01	TC-11	484-01	DT4S1	" "
12	.05	200	30-4518	TP428	S-4-05	TC-15	484-05	DT4S5	AVC Filter
13	.05	200	30-4518	TP428	S-4-05	TC-15	484-05	DT4S5	Screen Bypass
14	.1	200	30-4527	TP428	S-4-1	TC-1	484-.1	DT4P1	Cath. Bypass
15	.2	400	76-1198	TP429	S-4-2	TC-2	484-.2	DT4P2	Line Isolating Trap*
16	.0015	600	30-4628	TP404	S-6-001	TC-21	684-001	DT6D1	Ant. Coupling
17	250	500	6010245307	MC240	M0.5-325	1FM-325	1468-00025	5W5T25	50L6 Grid Bypass
18	3		30-1221						RF Plate Bypass†
19	10	500	6000105407	MC215	M0.5-41	ME-41	1468-00001	5W5Q1	Fixed Trimmer †
20	100	500	6010105407	MC235	M0.5-31	1FM-31	1468-0001	5W5T1	RF Coupling

*Wind same number of turns of wire on replacement as on original.
†Not used on all models.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: PHILCO PART No.	MALLORY PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
21	500KΩ	1	33-5491				Volume Control & Switch

RESISTORS

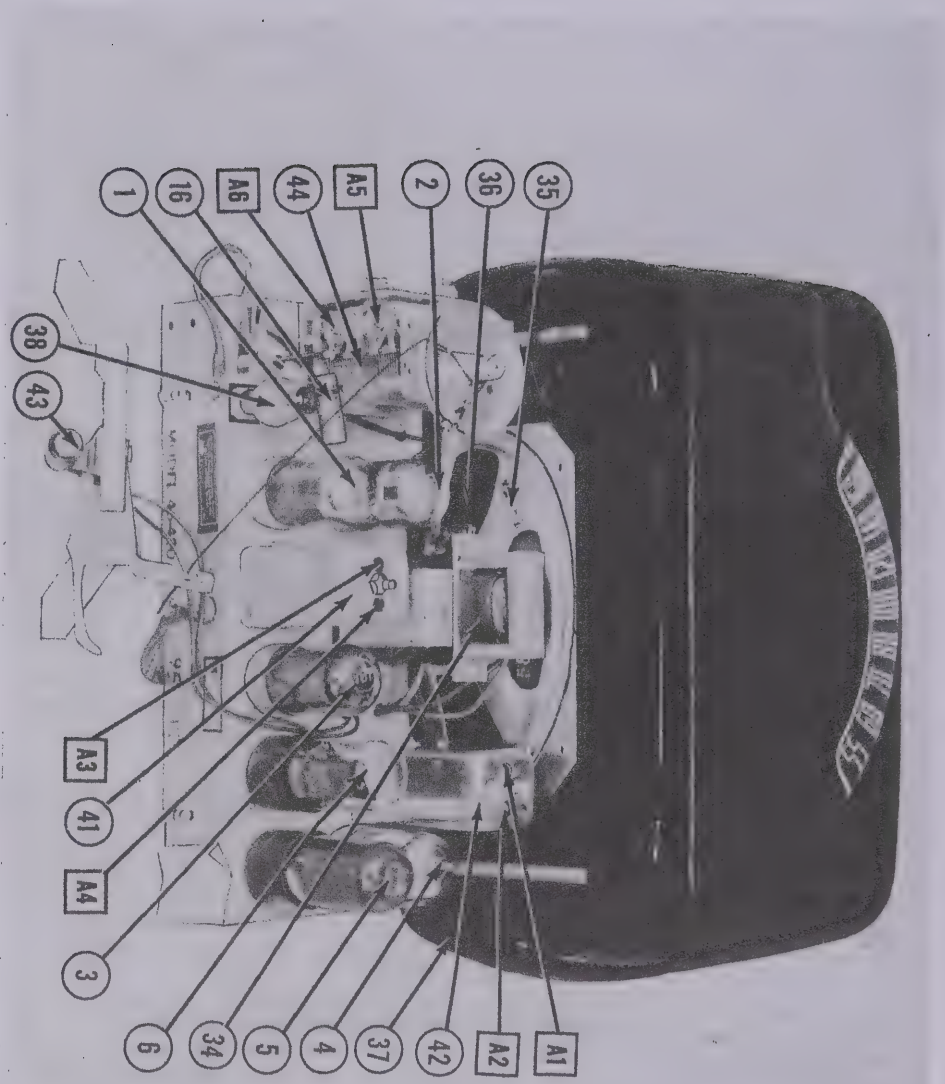
ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
22	1 Meg.	½	66-5103340	BTS-1 Meg.	Br.-Blk.-Grn. RF Grid
23	180Ω	1	66-1184360	BW-1-180	Br.-Gray-Br. RF Cathode
24	15KΩ	½	66-3153340	BTS-15K	Br.-Grn.-Or. RF Coil Shunt-See Note 1
25A	120KΩ	½		BTS-120K	Br.-Red-Yl. Osc. Grid Later Production
B	47KΩ	½	66-3473340	BTS-47K	Yl.-Vi.-Or. Osc. Grid Early Production
26	15KΩ	½	66-3153340	BTS-15K	Br.-Grn.-Or. Screen Dropping
27	3.3 Meg.	½	66-5333340	BTS-3.3 Meg.	Or.-Or.-Grn. 1st AF Grid
28	2.2 Meg.	½	66-5223340	BTS-2.2 Meg.	Red-Red-Grn. AVC Filter
29	470KΩ	½	66-4473340	BTS-470K	Yl.-Vi.-Yl. 1st AF Plate Load
30	470KΩ	½	66-4473340	BTS-470K	Yl.-Vi.-Yl. Output Grid
31	130Ω	1	66-1123340	BW-1-120	Br.-Or.-Br. Output Cathode
32	45Ω	10	33-3408-1	AB-50	Line Dropping
33	120KΩ	½		BTS-120K	Br.-Red-Yl. Line Isolating-See Note 1

Note 1 - Not used in all models.

TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: THORDAR'N PART No.		INSTALLATION NOTES
34	2390Ω	3.9Ω	170Ω	.42Ω	Part of 36-1591	A-3876	T22845		

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			PHILCO PART No.	JENSEN PART No.		
	FIELD RES.	VC IMP.				
35	600Ω	3.92Ω	36-1591			
	CONE DIA.	VC DIA.				
36	4"x6"	½"	NOT READILY REPLACEABLE-USE COMPLETE SPEAKER UNIT.			

R F COILS

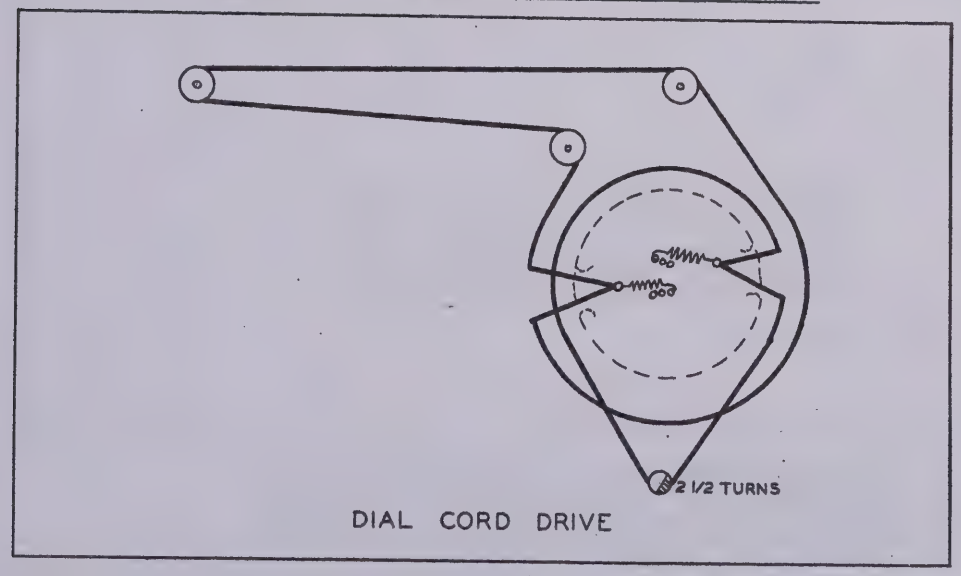
ITEM No.	USE	DC RES.		REPLACEMENT DATA		INSTALLATION NOTES
		PRI.	SEC.	PHILCO PART No.	MEISSNER PART No.	
37	Loop Ant.		3Ω	32-4054		
38	Ant. Coil	32Ω	.8Ω	32-3394		
39	RF Coil	30Ω	29.5Ω	32-3595		
40	Osc. Coil	2.8Ω	6.8Ω	32-3613	14-1040	
41	Input IF	32Ω	22Ω	32-4026	16-6658	
42	Output IF	20Ω		32-3948	16-6670	

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					PHILCO PART No.		
43	Bayonet	Brown	0.15	Brown	34-2068		Type 47

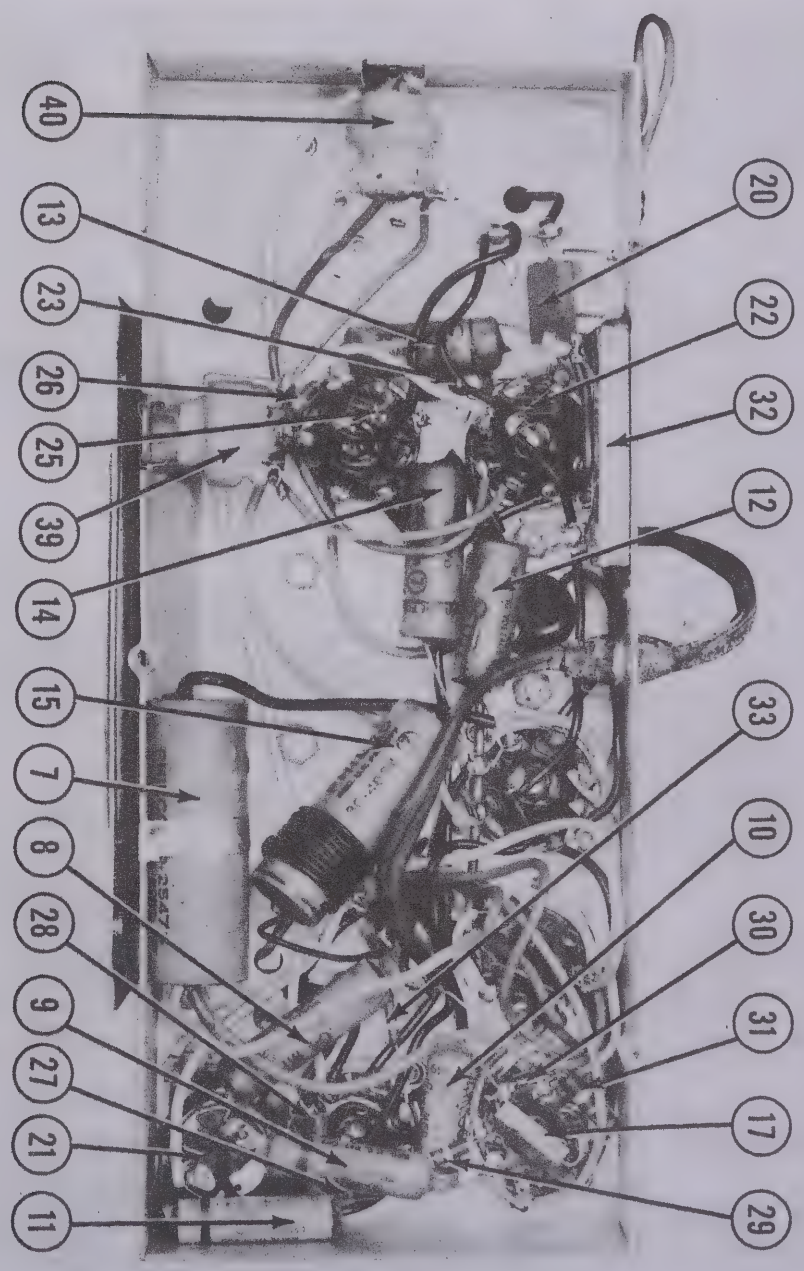
MISCELLANEOUS

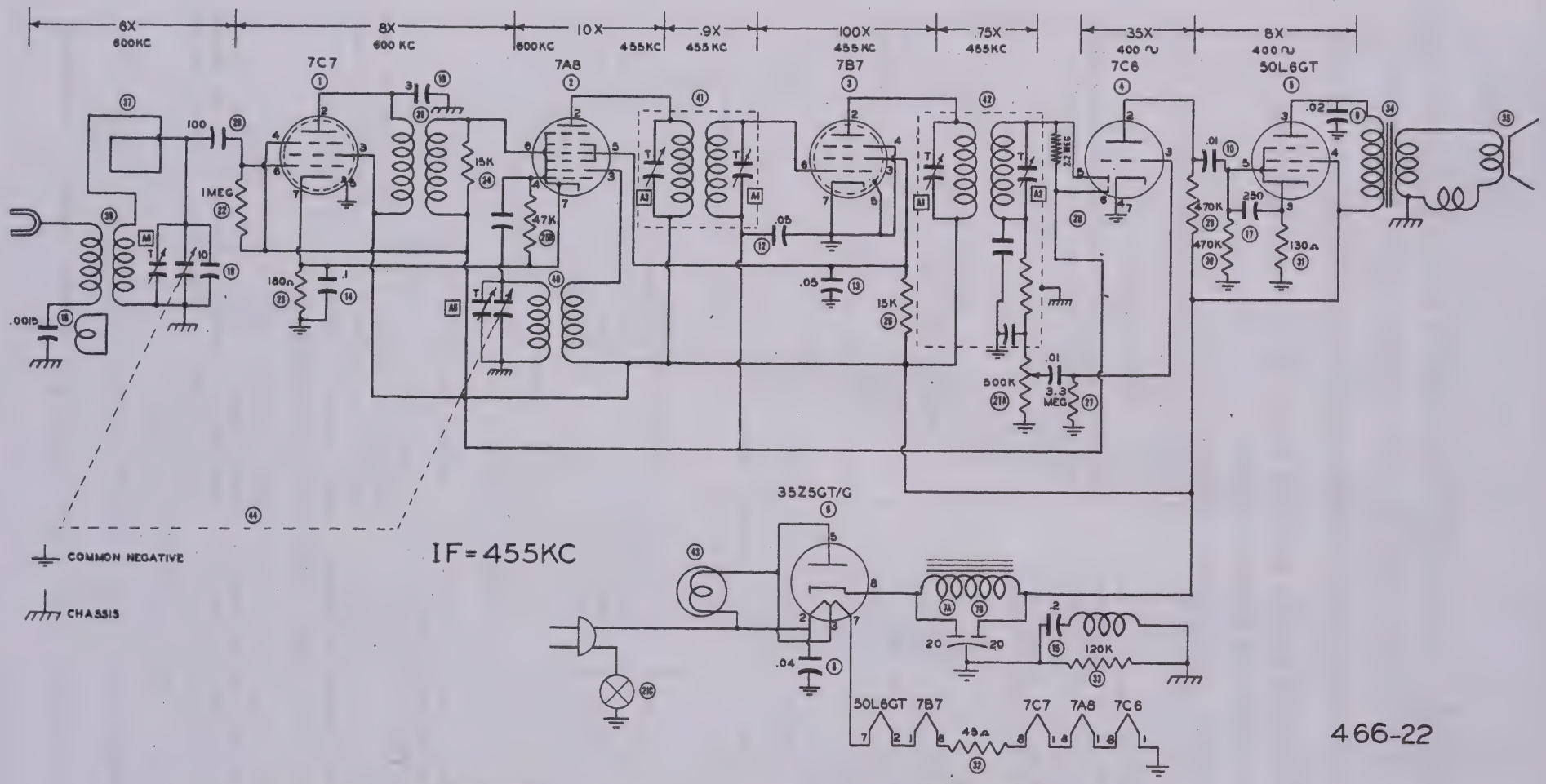
ITEM No.	PART NAME	PHILCO PART No.	NOTES
44	Tuning Cap.	31-2636	2 Gang Variable Cap.
	Cabinet	10629-A	(Including Scale)
	Knob Assby.	54-4218	
	Pointer	54-4253	Dial
	Scale	27-5843	"



DIAL CORD DRIVE

CHASSIS—BOTTOM VIEW





466-22

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	7C7	14 V.AC	87 V.DC	87 V.DC	-.6 V.DC	0 V.	0 V.	1.3 V.DC	21 V.AC
2	7A8	6.5 V.AC	87 V.DC	87 V.DC	-2 V DC	50 V.DC	-.6 V.DC	1.3 V.DC	14 V.AC
3	7B7	35 V.AC	87 V.DC	50 V.DC	0 V.	0 V.	-.6 V.DC	0 V.	28 V.AC
4	7C6	0 V.	55 V.DC	-.55 V.DC	0 V.	-.4 V. DC	-.6 V.DC	0 V.	6.5 V.AC
5	50L6GT	0 V.	35 V.AC	80 V.DC	87 V.DC	0 V.	0 V.	87 V.AC	57 V.DC
6	35Z5GT	87 V.DC	117 V.AC	113 V.AC	87 V.DC	113 V.AC	87 V.DC	87 V.AC	115 V.DC

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	7C7	13.5 Ω	100 KΩ	100 KΩ	3 MEG	0 Ω	4 MEG	175 Ω	20.5 Ω
2	7A8	6 Ω	100 KΩ	100 KΩ	115 KΩ	115 KΩ	3 MEG	175 Ω	13.5 Ω
3	7B7	71 Ω	100 KΩ	115 KΩ	0 Ω	0 Ω	3 MEG	0 Ω	64 Ω
4	7C6	0 Ω	570 KΩ	3.2 MEG	0 Ω	540 KΩ	3 MEG	0 Ω	6 Ω
5	50L6GT	INF	71 Ω	100 KΩ	100 KΩ	480 KΩ	0 Ω	119 Ω	140 Ω
6	35Z5GT	100 KΩ	145 Ω	142 Ω	100 KΩ	142 Ω	100 KΩ	119 Ω	100 KΩ

Resistance readings in the B+ circuits may vary widely according to the condition of the filter capacitors.

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

Paragraph

sembly to part no. 76-1644-2 and the cabinet back to 54-7097. Part of manual affected: Replacement Parts List.

6 The following alignment information should be used instead of that given on page 6 of the manual.

ALIGNMENT PROCEDURE

In order to perform the i-f alignment it is necessary to remove the chassis from the cabinet. Disconnect the dial cord from the dial pointer and unsolder the aerial-loop leads before removing chassis. After the i-f alignment is completed, install chassis in cabinet, connect loop leads and the dial cord. Set the dial pointer to coincide with the dot at the extreme low-frequency end of the scale with the condenser plates fully meshed. Adjust the oscillator and antenna trimmers as outlined in the accompanying alignment chart.

CONNECTING ALIGNING EQUIPMENT

OUTPUT METER: Connect to output (left-hand) and ground (center) lugs of terminal panel on rear of chassis as shown in Figure 11.

SIGNAL GENERATOR: For i-f alignment, connect high side of generator through .05-mf condenser to point given in chart; low side to B—. For r-f alignment, connect generator to a radiating loop approximately 6 inches in diameter, made up of six turns of wire. Place this loop three or four inches from loop in receiver. Adjust output of generator to maintain output-meter reading below 1.25 volts during i-f and r-f alignment.

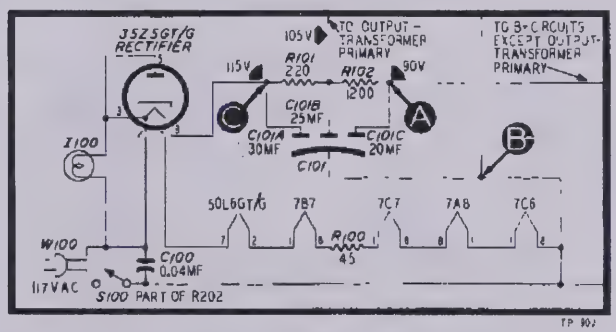
VOLUME CONTROL. In full clockwise position.

ALIGNMENT CHART

SIGNAL GENERATOR		RECEIVER		
Connections to Receiver	Dial Setting	Dial Setting	Special Instructions	Adjust Trimmers
Stator-plate terminal of antenna section of tuning condenser and B—.	455 kc.	540 kc.	Turn C303B down light. Adjust trimmers for maximum in order given. ONCE ONLY.	C301B C301A C300A C300B
Radiating loop.:	1600 kc.	1600 kc.	Adjust for maximum.	C404B
Radiating loop.:	1500 kc.	1500 kc.	Adjust for maximum.	C404A

7 Beginning with "run 2" of code 121, the value of R400 was changed from 47,000 ohms (part no. 66-3473340*) to 120,000 ohms (part no. 61-4123340*). Reason: To improve oscillator stability at low frequencies. Parts of manual affected: Figure 9, Figure 12, and Replacement Parts List.

8 Beginning with "run 2" of code 121, a resistor R404, 120,000 ohms (part no. 66-4123340*), was added between B— and chassis. Reason: To eliminate hum due to variable leakage under high-humidity conditions. Parts of manual affected: Figure 9, Figure 10, Figure 12, and Replacement Parts List.



Section 1 Schematic (for code 122)

9 Beginning with code 122, the schematic diagram of Section 1 (power supply was changed according to the accompanying drawing. Reason: To use PM speaker.

At this point the following changes and additions were made:

C101 was changed from 20-20 mf (part no. 30-2547) to 30-25-20 mf (part no. 30-2540-1*). Part is connected as shown in the drawing.

LS200 was changed from an electrodynamic loudspeaker (part no 36-1591*) to a PM loudspeaker (part no. 36-1615*).

R101, 220 ohms, (part no. 66-1224340*) was added: This part is connected as shown in the drawing.

R102, 1200 ohms (part no. 66-2123340*) was added: This part is connected as shown in the drawing. Parts of manual affected: Figure 3, Figure 4, Figure 12, and Replacement Parts List.

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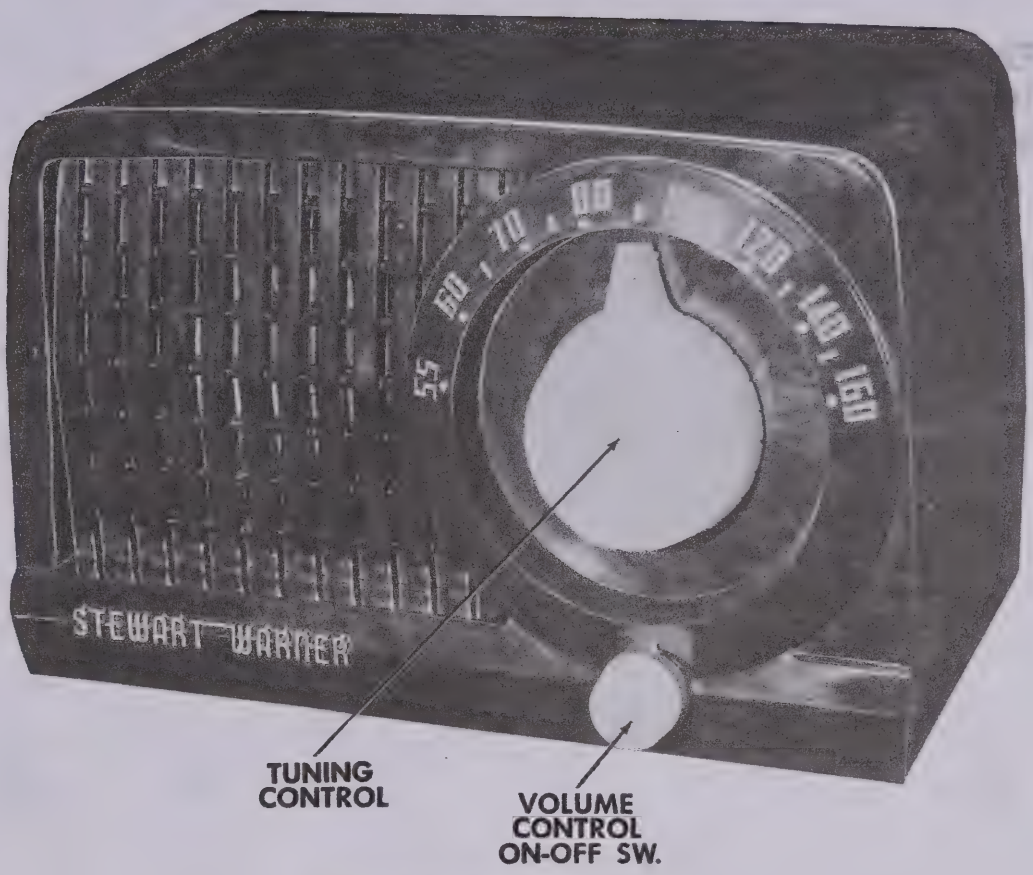

STEWART WARNER
MODELS 9160AU, BU, CU, DU, EU

STEWART WARNER
MODELS 9160AU, BU, CU, DU, EU

STEWART-WARNER MODEL 9160-AU

TRADE NAME	Stewart-Warner Models 9160-AU, 9160-BU, 9160-CU, 9160-DU, 9160-EU
MANUFACTURER	Stewart-Warner Elect., Div. of Stewart-Warner Corp., 1300 N. Kostner Ave., Chicago 15, Ill.
TYPE SET	AC-DC Operated AM Superheterodyne Receiver
TUBES (FIVE)	Types 12BE6 Conv., 12BA6 IF Amp., 12AT6 Det.-AVC-AF Amp., 50C5 Audio Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC/DC
RATING	.260 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	550-1650 KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Use an isolation transformer if available.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.		Loop	455 KC (400~ Mod)	Any point of non-interference.	Across voice coil	A1, A2 A3, A4	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
2.		"	1500 KC	1500 *	"	A5	Adjust for maximum output.
3.		"	1500 KC	Tune to 1500 KC signal	"	A6	"

* Replace chassis in cabinet, place pointer on shaft and set pointer to the 1500 mark on the dial. Then remove pointer and chassis, being careful not to disturb the setting of the tuning gang, and proceed with the alignment.

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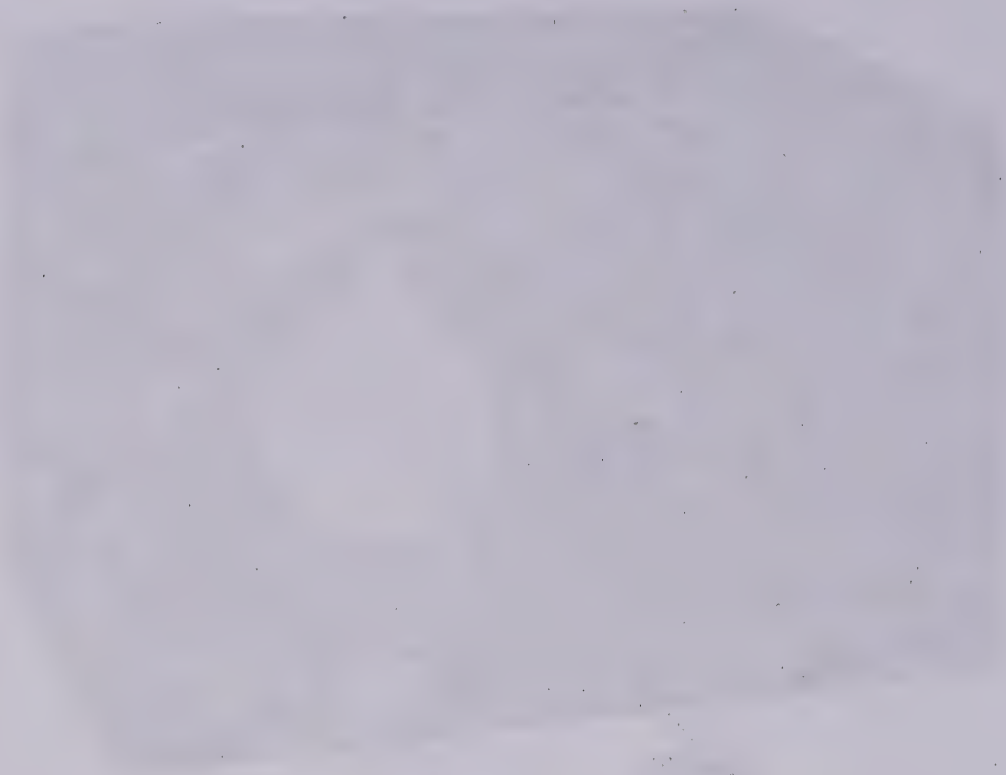


PARTS LIST AND DESCRIPTIONS

STEWART-WARNER MODEL 9160-AU

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: Stewart-Warner PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amplifier	12BA6	12BA6	7BK	
V3	Det. -AVC-AF Amp.	12AT6	12AT6	7BT	
V4	Audio Output	50C5	50C5	7CV	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: Stewart Warner PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	50	150	509837	PRS150/50-30		EDL-5315		TVA-2450	Filter (Red)
B	30	150							Filter (Blue)
C2	33		513028	SI33	D6-330		GP1K-330	5GA-Q33	Osc. Grid Cap.
C3	.05	400	512028	P488-05	DF-503	PTE4S5		4TM-S5	AVC Filter
C4A	220								Diode RF Filter
B	.002								Audio Coupling
C	.005		♦509836		♦PC-150				Audio Coupling
D	250								AF Amp. Plate Bypass
E									Audio Output Grid
C5	.02	400	512016	P488-02	DF-203	PTE4S2		4TM-S2	Audio Output Plate
C6	.05	400	512028	P488-05	DF-503	PTE4S5		4TM-S5	Rectifier Plate
R7	.15	400	512040	P488-15		PTE4P15		4TM-P-5	Line Isolation

♦ Items C4A, C4B, C4C, C4D, C4E, R5A, R5B, R5C are combined in one unit.
When replacing items separately C4D and C4E should total 250MMF.

CONTROLS

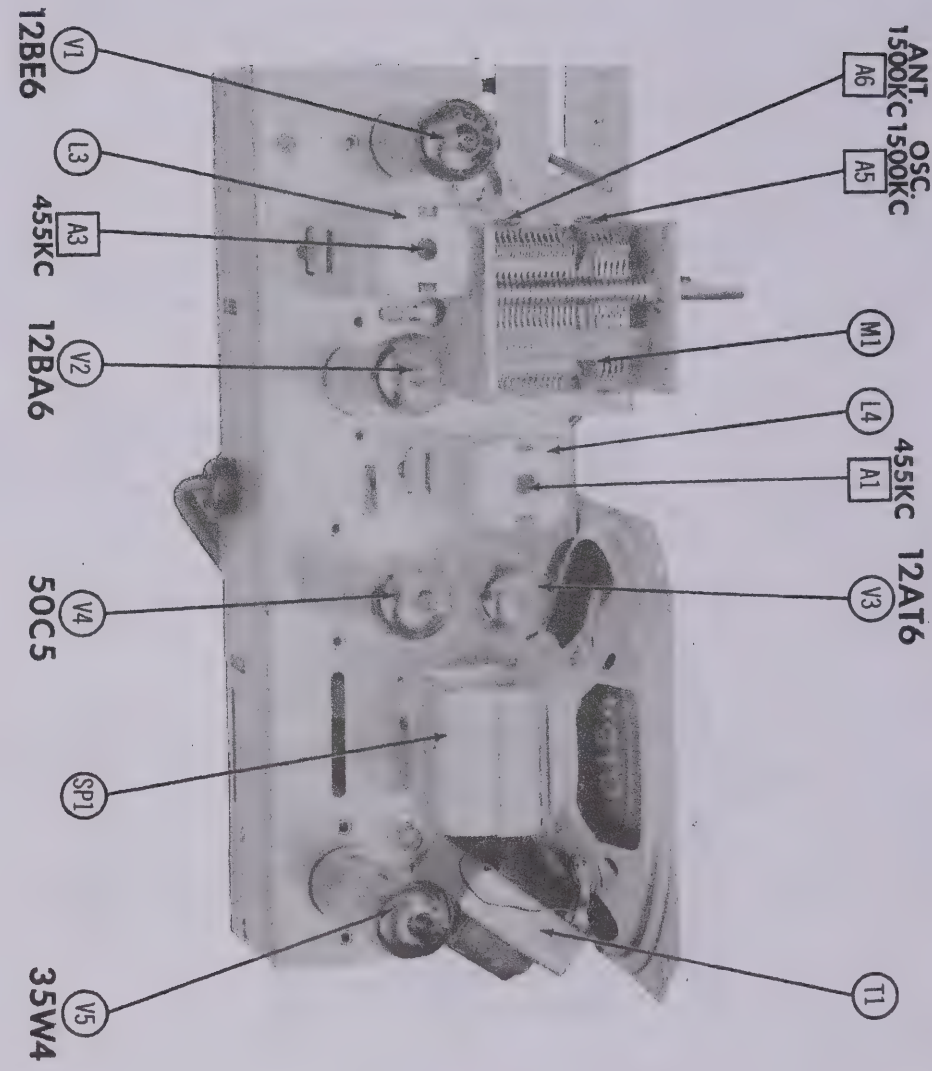
ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: Stewart Warner PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	INSTALLATION NOTES
R1A	1Meg	½	509830	Q13-137	AG-63-Z	BSK-70-S	Volume Control
B	Shaft		Not Req.	Not Req.	KSS-3	Not Req.	Attach to R1A per instructions
C	Switch		Not Req.	76-1	SWB	Not Req.	Attach to R1A per instructions

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: Stewart Warner PART No.	IRC PART No.	IDENTIFICATION CODES
R2	22KΩ	½	510161		Osc. Grid
R3	100Ω	½	510119	BTS-100	IF Amp. Cathode
R4	3.3Meg	½	510194	BTS-3.3Meg	AVC Network
R5A	6.8Meg	½		BTS-6.8Meg	AF Amp. Grid
B	470KΩ	½	♦509836	BTS-470K	AF Amp. Plate
C	470KΩ	½		BTS-470K	Output Grid
R6	150Ω	½	510122	BTS-150	Output Cathode
R7	1000Ω	1	510237	BTA-1000	Filter
R8	33Ω	½	510209		Filament Dropping

♦ Items R5A, R5B, R5C, C4A, C4B, C4C, C4D, C4E are combined in one unit.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		Stewart Warner PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T1	2.5KΩ	3.9Ω	230Ω	.8Ω	509826	A-3332 ①	A-3025 ①	RO-2 ①	① Drill one new mtg. hole

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			NOTES
	FIELD RES.	V. C. IMP.	Stewart Warner PART No.	JENSEN PART No.	QUAM PART No.	
SP1A	PM	3.9Ω	C-509828		4A07	
	CONE DIA.	V. C. DIA.				
SP1B	4"	9/16"				

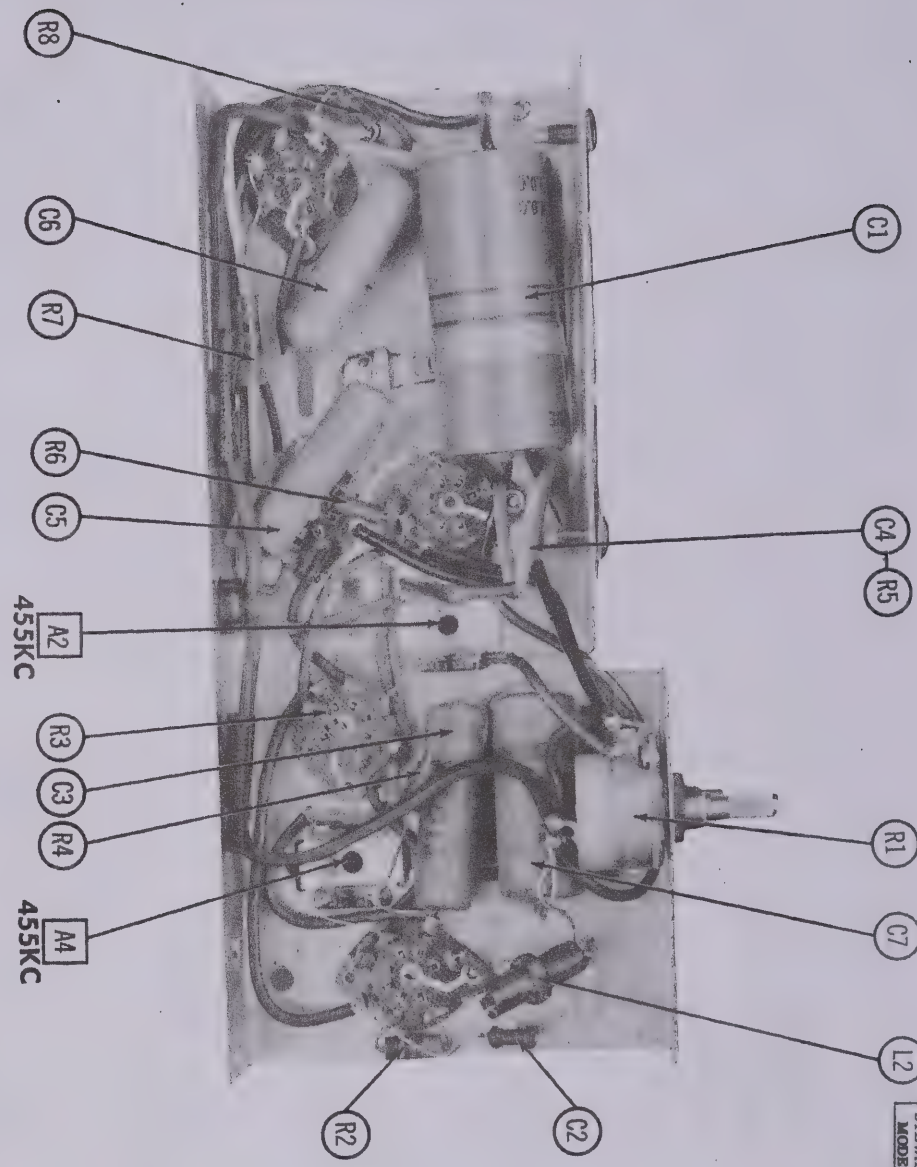
COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA		NOTES
		PRI.	SEC.	Stewart Warner PART No.	MERIT PART No.	
L1	Loop Ant.	3.2Ω		509833		
L2	Osc. Coil	.8Ω	10Ω	509832	*BC-397	* Drill mounting hole
L3	Input IF	17Ω	17Ω	509433	BC-352	
L4	Output IF	17Ω	17Ω	509433	BC-353	

MISCELLANEOUS

ITEM No.	PART NAME	Stewart Warner PART No.	NOTES
M1	2 Gang Var. Cap.	509827	(27-404MMF, 15-150MMF)
	Cabinet	509840-A	Model 9160-AU (Mahogony)
	Cabinet	509840-B	Model 9160-BU (Yellow)
	Cabinet	509840-C	Model 9160-CU (Blue)
	Cabinet	520342	Model 9160-DU (Rust)
	Cabinet	520343	Model 9160-EU (Tan)
	Knob	509839-A	Tuning -Models 9160-AU & 9160-DU (Tan)
	Knob	509839-B	Tuning -Model 9160-BU (Green)
	Knob	509839-C	Tuning -Model 9160-CU (Blue)
	Knob	509839-E	Tuning -Model 9160-EU (Rust)
	Knob	509841-A	Volume-Models 9160-AU & 9160-DU (Tan)
	Knob	509841-B	Volume-Model 9160-BU (Green)
	Knob	509841-C	Volume -Model 9160-CU (Blue)
	Knob	509841-E	Volume- Model 9160-EU (Rust)

CHASSIS—BOTTOM VIEW

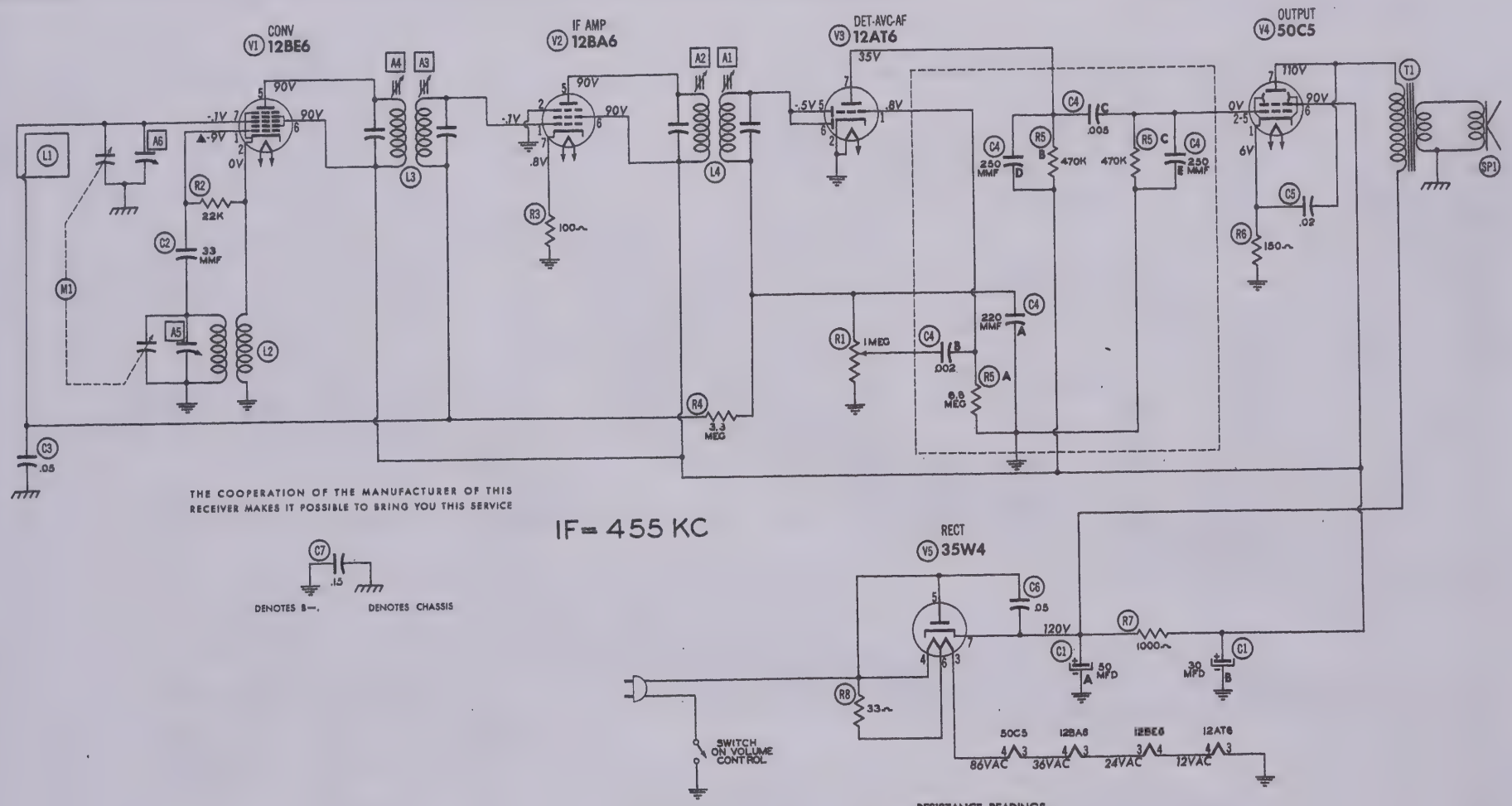


SET 171

FOLDER 10

STEWART-WARNER MODEL 9160-AU

STEWART-WARNER MODEL 9160-AU



THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

IF = 455 KC

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	.8Ω	24Ω	12Ω	†1KΩ	†1KΩ	4.3Meg
V 2	12BA6	4.3Meg	0Ω	24Ω	36Ω	†1KΩ	†1KΩ	100Ω
V 3	12AT6	6.8Meg	0Ω	0Ω	12Ω	1Meg	1Meg	†470KΩ
V 4	50C5	150Ω	470KΩ	36Ω	86Ω	470KΩ	†1KΩ	†230Ω
V 5	35W4	60KΩ	60KΩ	86Ω	121Ω	103Ω	103Ω	60KΩ

† MEASURED FROM PIN 7 OF V5
▲ TAKEN WITH VACUUM TUBE VOLTMETER

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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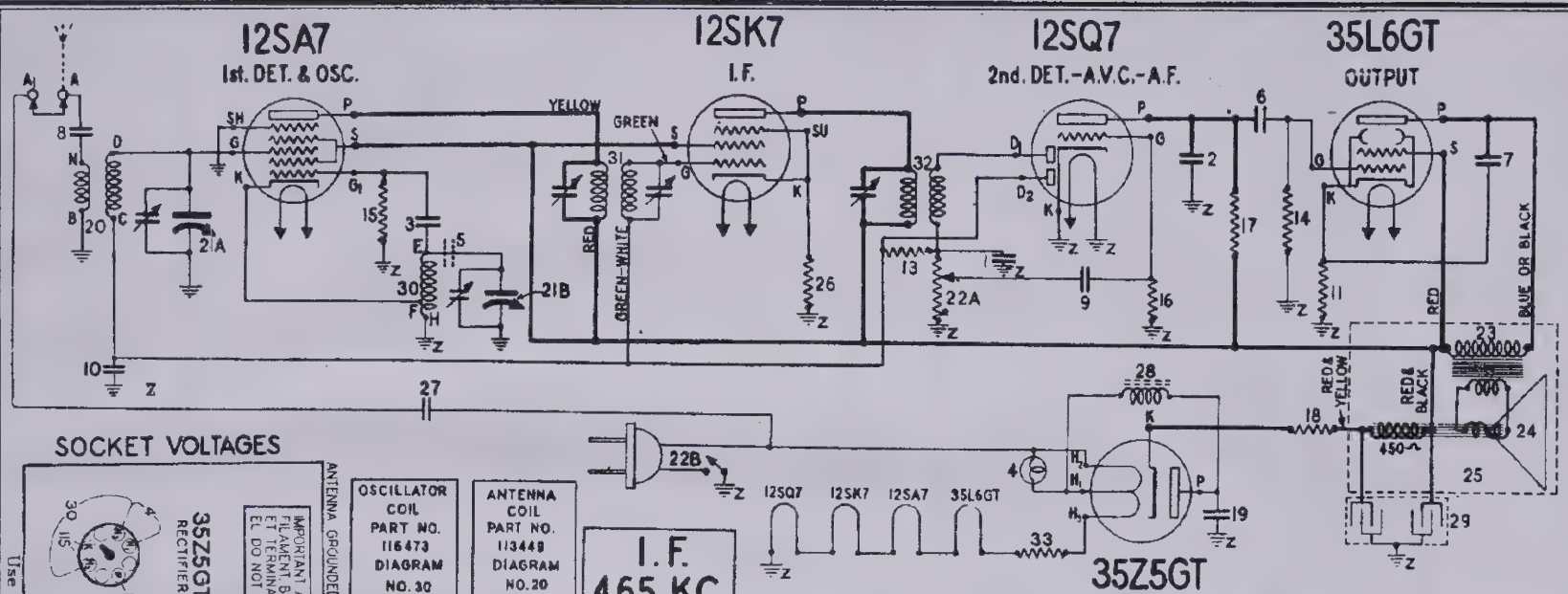
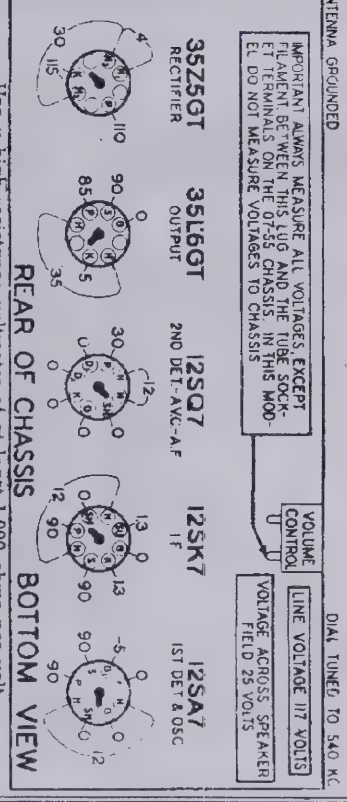
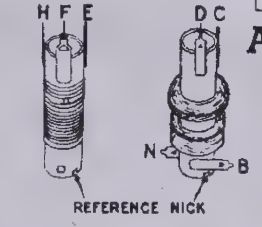
171-10

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.



SOCKET VOLTAGES


35Z5GT RECTIFIER
35L6GT OUTPUT
12SQ7 2ND DET.-AVC.-A.F
12SK7 I.F.
12SA7 1ST DET. & OSC
REAR OF CHASSIS
BOTTOM VIEW
IMPORTANT ALWAYS MEASURE ALL VOLTAGES EXCEPT FILAMENT BETWEEN THIS LUG AND THE TUBE SOCKET TERMINALS ON THE 07-55 CHASSIS. IN THIS MODEL DO NOT MEASURE VOLTAGES TO CHASSIS
VOLUME CONTROL
LINE VOLTAGE 117 VOLTS
VOLTAGE ACROSS SPEAKER FIELD 25 VOLTS
Use a high resistance voltmeter of at least 1,000 ohms per volt.



NOTE
TERMINALS OF COILS SHOWN IN PICTORIAL VIEWS ABOVE, ARE LETTERED TO CORRESPOND TO SIMILARLY LETTERED TERMINALS ON THE CIRCUIT DIAGRAM

APPLIES ONLY TO CHASSIS STAMPED 07-51H OR 07-55.

Diagram Number	Part Number	Description	List Price
1-2	83539	Condenser—mica 260 mmfd.	$0.20
3	83783	Condenser—mica, 110 mmf.	.20
4	85296	Lamp—dial 6 to 8 volt .25 amps.	.16
5	88026	Condenser—paper .02 mfd. 400 volt (07-55 only)	.25
6-7	88026	Condenser—paper .02 mfd. 400 volt	.25
8-9	88029	Condenser—paper .004 mfd. 400 volt	.25
10	88189	Condenser—paper .05 mfd. 200 volt	.25
11	89276	Resistor—wire wound 140 ohms ½ watt	.12
	89421	Condenser—paper .1 mfd. 200 volt	.25
13-14	110559	Resistor—carbon 470,000 ohms ¼ watt	.12
15	110578	Resistor—carbon 68,000 ohms ¼ watt	.12
16	110580	Resistor—carbon 3.3 meg. ¼ watt	.12
17	110591	Resistor—carbon 680,000 ohms ¼ watt	.12
18	110975	Resistor—wire wound 33 ohms ½ watt (10%)	.12
19	111252	Condenser—paper .05 mfd. 400 volt	.13
20	113449	Coil—antenna	.78
21A-21B	114870	Condenser—variable gang	2.85
22A-22B	114879	Volume control—1 megohm; with switch	.96
23	R-114885	Transformer—output for R-115041 speaker	1.75
	0-116342	Transformer—output for 0-115041 speaker	1.75
	0-116487	Transformer—output for 0-115050 speaker	1.25
	R-116524	Transformer—output for R-115051 speaker	1.65
24	R-114886	Cone & voice coil assembly for R-115041 & R-115051 speaker	$1.00
	0-116343	Cone & voice coil assembly for 0-115041 & 0-115050 speaker	1.50
25	0-115041	Speaker—dynamic 4" (07-51H)	4.70
	R-115041	Speaker—dynamic 4" (07-51H)	4.70
	0-115050	Speaker—dynamic 4" (07-55)	3.75
	R-115051	Speaker—dynamic 4" (used on some 07-51H)	3.75
26	116062	Resistor—150 ohms ± 20% ¼ watt	.12
27	116224	Condenser—mica 260 mmfd. 500 volt	.15
28	116232	R. F. Choke	.48
	0-116342	Transformer—output for 0-115041 speaker.	1.75
	0-116343	Cone & voice coil assembly for 0-115041 & 0-115050 speaker	1.50
29	116470	Condenser—electrolytic 20-20 mfd. 150 volt	.96
30	116473	Coil—oscillator	.35
31	116474	Transformer—1st I.F.	1.10
32	116475	Transformer—2nd I.F.	1.00
	0-116487	Transformer—output for 0-115050 speaker.	1.25
	R-116524	Transformer—output for R-115051 speaker.	1.65
33	116527	Resistor—100 ohms ± 10% 3 watt W.W.	.26

GROUNDS MARKED "Z"

07-55 CHASSIS: ALL GROUNDS MARKED "Z" ARE NOT CONNECTED DIRECTLY TO CHASSIS BUT ARE CONNECTED TOGETHER AND GROUNDED TO CHASSIS THROUGH .1 MFD. CONDENSER (PART NO. 89421.

07-51H CHASSIS: GROUNDS MARKED "Z" CONNECTED DIRECTLY TO CHASSIS.

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MODELS 07-511H to 07-519H
Chassis 07-511
07-551 to 07-559
Chassis 07-55
Alignment, Trimmers
Antenna Data

STEWART-WARNER CORP.

ALIGNMENT PROCEDURE

FOR ALIGNMENT: An output meter and an accurately calibrated signal generator are required.

1. On the 07-51H, connect the output meter across the voice coil or between the plate of the 35L6GT output tube and chassis through a .1 mfd. condenser, depending upon the type of meter. The more sensitive type should be connected across the voice coil. THE CONNECTIONS FOR THE 07-55 ARE THE SAME EXCEPT CONNECT THE GROUND LEAD TO THE POINT SHOWN IN FIG. 2 INSTEAD OF TO CHASSIS.
2. When aligning the 07-51H chassis, connect the ground lead of the signal generator to the chassis of the receiver through a .25 mfd. condenser and keep it connected in this manner throughout the entire alignment procedure. FOR THE GROUND LEAD CONNECTION TO THE 07-55 CHASSIS, REFER TO "BOTTOM VIEW." FIG. 2.
3. Turn the volume control to the maximum volume position and keep it in this position throughout the entire alignment procedure.
4. Remove the connector between Terminals A and A_1.

Dummy Ant. in Series with Sig. Gen.	Connection of Sig. Generator To Receiver	Signal Generator Frequency	Receiver Dial Setting	Trimmer Number	Trimmer Description	Type of Adjustment
200 MMFD. Mica Condenser	Trimmer Lug On Front Section Of Variable Condenser	465 KC	1750 KC	1	2nd I.F.	Adjust for Maximum Output, Then Repeat Adjustment.
				2-3	1st I.F.	
200 MMFD. Mica Condenser	Antenna Terminal (A)	1500 KC	1500 KC	4	Broadcast Oscillator (Shunt)	Adjust for Maximum Output.
200 MMFD. Mica Condenser	Antenna Terminal (A)	1500 KC	Tune To 1500 KC Generator Signal	5	Broadcast Antenna (Shunt)	Adjust for Maximum Output.

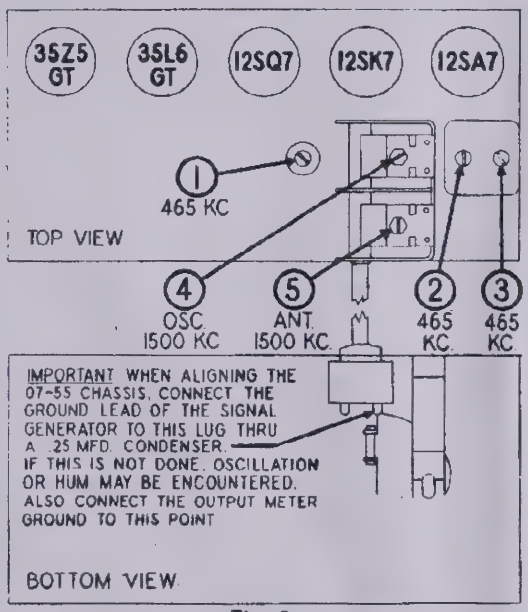

Fig. 2

BUILT-IN ANTENNA SYSTEM

The Built-In Antenna incorporated in this receiver will generally give very satisfactory results in localities where powerful broadcast stations exist. This Built-In Antenna will function when terminals A and A_1 on the back of the chassis are connected together. In cases where noise is excessive or greater sensitivity is desired, remove the jumper connecting terminals A and A_1 and connect an external antenna to terminal A.

The Built-In Antenna Condenser No. 27 couples the primary of the antenna coil to one side of the power line, which acts as the antenna. The R. F. choke No. 28 is an iron-core choke whose impedance is high at broadcast frequencies. This choke serves to prevent condenser No. 19 from by-passing the signal voltage picked up by the power line. It also prevents feed-back into the antenna circuit of radio frequency energy generated in the set itself.

When aligning this receiver, the jumper connecting terminals A and A_1 should be removed. This will prevent picking up signals which might interfere with the alignment procedure.

MISCELLANEOUS PARTS

Part No.	Description	List Price
116485	Asbestos Pad-Model 07-55 only	$0.03
116467	Base—Condenser Mounting	.04
116471	Cover for elect. condenser—(07-55) only	.05
116651	Clamp for power cord—(07-55) only	.02
112745	Clip—coil mounting	.01
114982	Socket—for dial lamp	.20
114875	Socket—octal base	.15
85040	Screw—No. 6 Hex. Hd.—Per C	.35
116223	Terminal strip—antenna (A-A_1)	.12

CABINETS

116750	Cabinet (wood)—(07-514H) and (07-554)	7.00
116341	Cabinet (metallic green)—(07-513H) (07-553)	2.75
116340	Cabinet (metallic red) (07-513H) (07-553)	2.75
116339	Cabinet (metallic blue) (07-513H) (07-553)	2.75
116338	Cabinet (sprayed ivory)—(07-513H) (07-553)	2.75
114950	Cabinet (walnut)—(07-511H) (07-551)	2.00
114900	Cabinet (ivory plaskon)—(07-512H) (07-512H-S) (07-552S) (07-552)	3.40

CABINET BACK

116497	Cabinet Back (walnut) (07-511H) (07-513H)	.12
116496	Cabinet Back (ivory) (07-513H) (07-512H)	.12
116481	Cabinet Back (ivory) (07-552S)	.12
116480	Cabinet Back (walnut) (07-551) (07-553)	.12
116477	Cabinet Back (ivory) (07-551) (07-553) (07-552)	.12

TUNING KNOBS

116297	Knob—tuning (ivory)—(07-513H) (07-553)	.40
114975	Knob—tuning (walnut)—(07-511H) (07-551) (07-514H)	.45
114973	Knob—tuning (red)—(07-512H) (07-512H-S) (07-513H) (07-553) (07-552) (07-552S)	.45

VOLUME KNOBS

116299	Knob—tuning (ivory) (07-513H) (07-553)	.08
114933	Knob—tuning (walnut) (07-511H) (07-514H) (07-551)	.12
114867	Knob—tuning (red) (07-512H-S) (07-512H) (07-513H) (07-552S) (07-552) (07-553)	.08

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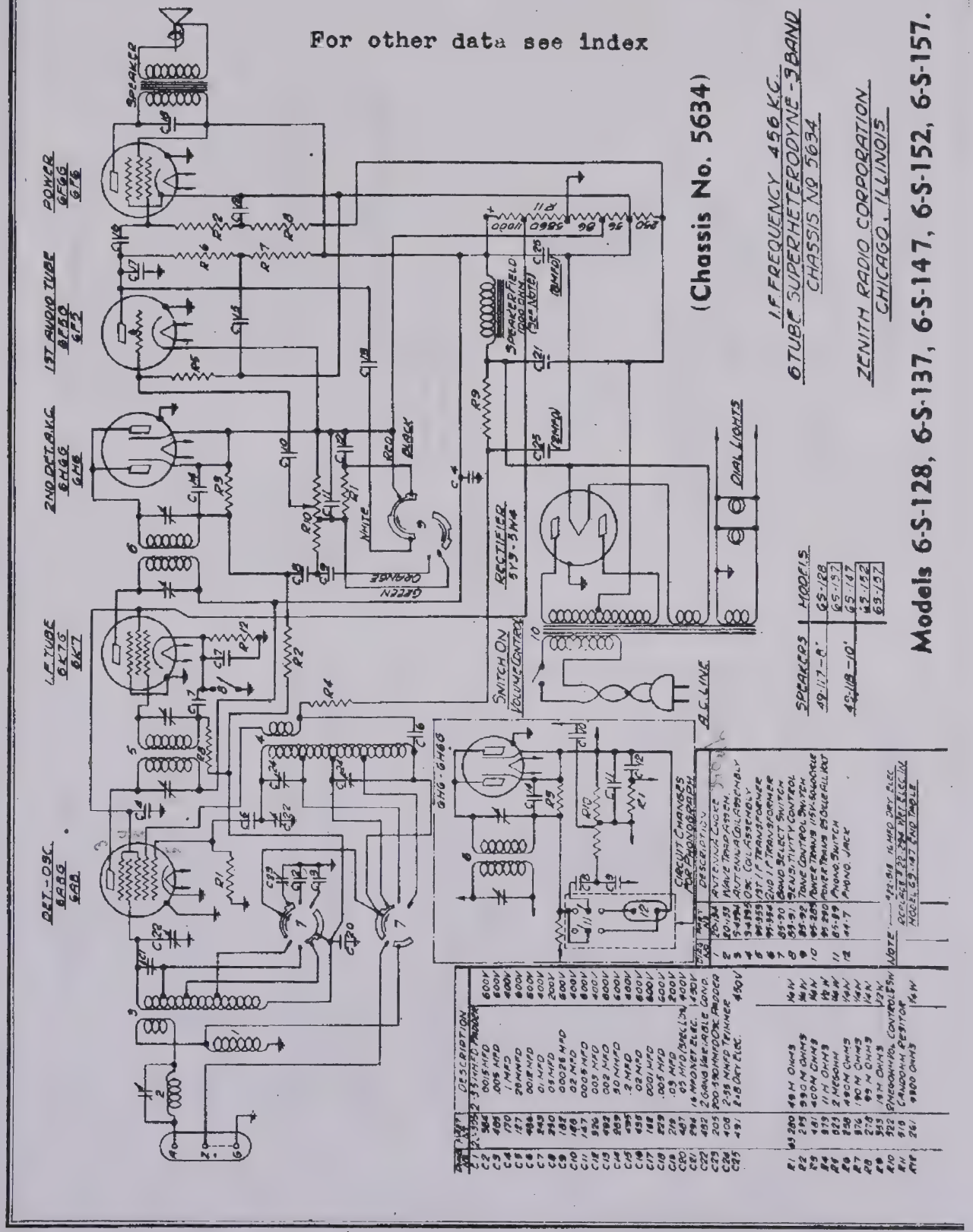
ZENITH RADIO CORP.

MODELS 6-S-128, 6-S-137
6-S-147, 6-S-152
6-S-157
Chassis 5634
Schematic, Parts

For other data see index



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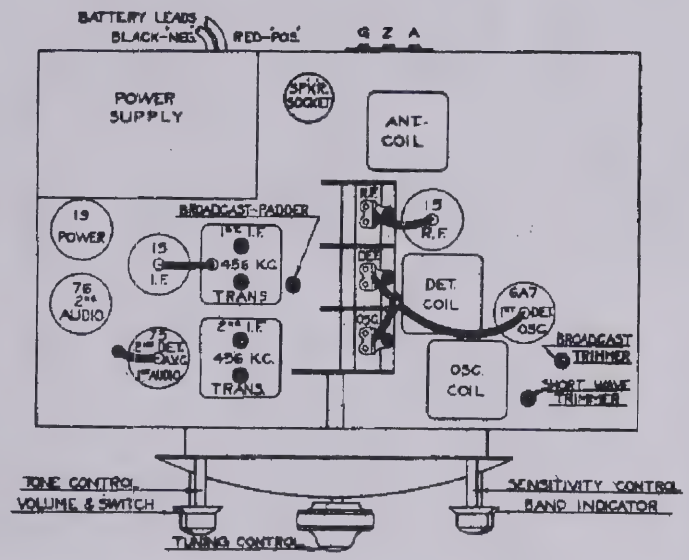
MODELS
6-B-107, 6-B-129, 6-B-164
CHASSIS No. 5635

SOCKET VOLTAGES

Tube	Position	Ef	Eg	Eg¹	Eg²	Eg³	Ep
15	R. F.	2	1.5	0	65	—	115
6A7	Det. Osc.	6	2.5	0 -5	75 —	— —	115 135
15	I. F.	2	3.5	0	75	—	130
75	2nd Det. A.V.C.	6	1.2	0	—	—	35
76	1st Audio	6	6		—	—	125

f—filament; k—cathode; g¹—control grid; g²—screen grid; g³—suppressor grid; p—plate.

All voltages measured from socket contacts to ground with 1000 ohm per volt D. C. meter. Antenna and ground disconnected.
Battery Voltage 6V.
Battery Drain 2.2 amperes.
Power Output 2 watts.



TUBE POSITION

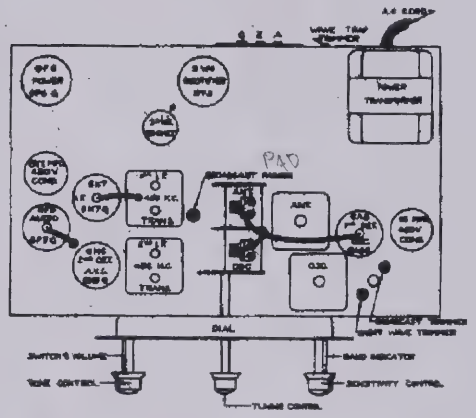
CAUTION: Reversal of the battery polarity will damage the filter condensers. The storage battery must be connected as shown above.
NOTE: See bottom page 18 for details of antenna connector strip.

MODELS
6-S-128, 6-S-137, 6-S-147, 6-S-152, 6-S-157
CHASSIS No. 5634

SOCKET VOLTAGES

Tube	Position	1	2	3	4	5	6	7	8	9
6A8	1st Det Osc.	0	6AC	280	80	—4	175	0	0	0
6K7	I F	0	6AC	280	80	0	—	0	Local 7	0
6H6	2nd Det A.V.C.	0	6AC	—2	—2	—2	—	0	—2	—
6F5	1st Audio	0	6AC	—	75	—	—	0	—2	—2
6F6	Power	0	6AC	260	280	—2	—	0	—2	—
5Y3 5W4	Rectifier	0	320	—	AC	—	AC	—	320	—

All voltages measured from point indicated to ground, using a 1000 ohm per volt meter. Antenna and ground disconnected.
Line Voltage 112V.
Current Consumption 75 watts.
Power Output 4 watts.
For other data see index



TUBE POSITION

NOTE: See bottom page 18 for details of antenna connector strip.

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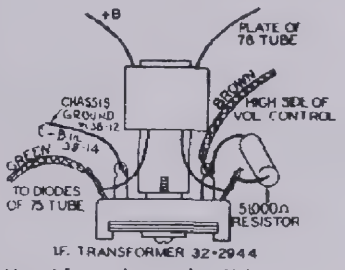
Philco 38-12

Run No. 3. It is important that the following leads be dressed in order to eliminate hum:

Dress the green wire connecting the *diodes of the 75 tube to the 2nd i-f* transformer as far as possible from the filament prongs of the 75.

The brown wire connecting the 51,000-ohm resistor to the high side of the volume control should be dressed under the coil of the 2nd i-f transformer.

The grid lead of the 75 tube should be dressed toward the back of the receiver and between the tube and shield.



New i-f transformer for Philco models 38-12 and 38-14.

The second i-f transformer, No. 12 in the schematic on *page 8-69 of Rider's Volume VIII*, has been changed from Part No. 32-2674 to No. 32-2944. Note that condenser 12B and 12C are part of the padder in these transformers. The wiring of this new transformer is shown in the accompanying illustration.

•

Philco 38-14

In the list of parts on *page 8-72 in Rider's Volume VIII*, the parts numbers of the following are incorrect:

Schematic No.	*Incorrect No.*	*Correct No.*
12—Compensator	31-6209	31 6100
20—Volume Control	33-5236	33-5230

A condenser, 5 mmf, was connected across the secondary of the short-wave transformer, No. 2. This condenser is connected to lugs Nos. 3 and 4 of the transformer shown on the schematic. *See page 8-71 of Rider's Volume VIII.*

Run No. 2. The second i-f transformer, No. 17, was changed from Part No. 32-2674 to No. 32-2944. The wiring lugs on the new transformer are slightly changed. The drawing of this transformer is shown in the preceding change notice covering Philco 38-12. Note that in the case of Model 38-12, the middle left-hand lead in the sketch goes to chassis ground, but in the Model 38-14, this same lead goes to -B.

Philco 38-4

Run No. 5. The two condensers, Part No. 30-1097, which were connected in parallel with the new air padder, No. 16 in Run No. 3 receivers (see SUCCESSFUL SERVICING, July 1938, page 2) have been removed, starting with Run No. 5. For schematic see *page 8-61 in Rider's Volume VIII.* In place of these condensers, a thermal compensator, Part No. 31-6227 is connected in parallel with the air padder. The air padder, No. 16, Part No. 31-6206, has also been relocated and is now mounted between the 6U7G r-f tube and the 6F6G output tube. (*See page 8-63 for chassis layout*). The thermal compensator, Part No. 31-6227, is also mounted in the same position with the thermostatic plate facing the power transformer.

The oscillator transformer, No. 15, *was changed from* Part No. 32-2631 to 32-2894. Connection No. 1 of the new transformer has been increased in length for soldering to the air padder in the new location.

•

Philco 38-14 (121, 124)

Run No. 4, Code 121. In order to eliminate hum modulation, the electrolytic condenser, No. 32, was changed from 16-mf to 40-mf, Part No. 30-2237. The electrolytic condenser in Code 124 receivers was also changed from 16- to 40-mf, Part No. 30-2256. The oscillator blocking condenser No. 8, 250-mmf was changed to 50-mmf, Part No. 30-1029.

See *page 8-71 in Rider's Volume VIII* for schematic of both codes.

•

Philco 38-33 (121)

Run No. 3. Resistor No. 20, 8000-ohms, was changed to 20,000-ohms, Part No. 33-320339. It was removed from the 90-volt wire (see schematic on *page 9-3 of Rider's Volume IX*) and reconnected to the 135-volt wire of the battery cable. The battery cable assembly was also changed to Part No. 41-3402.

Belmont 665,765

It will be noticed that another model number, 765, has been added to 665, which appears in the Index to Rider's Volume IX. This new series *starts with serial* 9A532400 for which the model numbers are 665 Series A, Issue B and 765 Series A. The servicing data on both these models are the same as the information published in Rider's Volume IX with the following changes:

A 6U5 tuning indicator tube has been added in the model 765. The grid *of the 6U5 is connected to the junction* of No. 5 terminal of the 6Q7G and R8; the target to +B; and the cathode to the junction of R10 and R12. See schematic on *page 9-21 in Rider's Volume IX.*

The short pieces of wire on the antenna coil, which are designated as CA and CB in the schematic, have been removed.

A resistor, R17, 2000 ohms, has been shunted across the P and H terminals of the oscillator coil.

A 0.008-mf, 800-volt condenser, C21, has been added between the plate of the output tube, 6AC5G, and ground.

The short-wave oscillator padder, C12, was not shown on the bottom view of the chassis. This is located on the layout just above and between the trimmers C8 and C11. Note that this padder C12 is adjusted at the factory and needs no other adjustment.

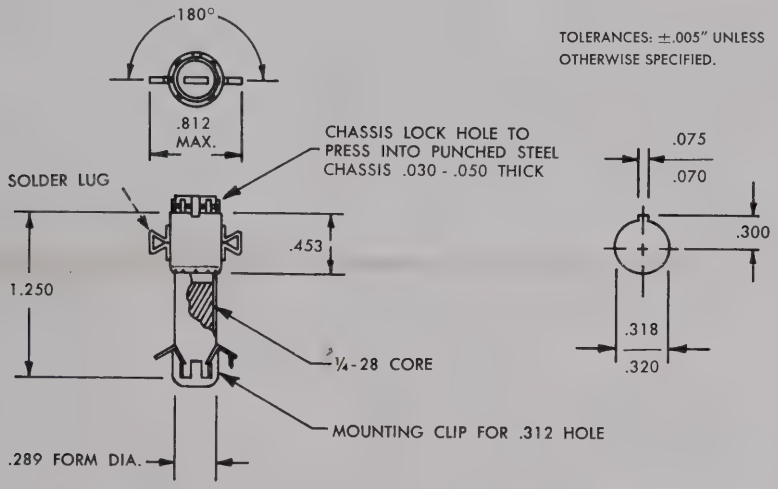
•

Zenith Chassis 5516, 5634, 5707

The alignment instructions for the three chassis mentioned above are identical and will be found below. The model numbers of the receivers in which these chassis are used will be found on *the pages of Rider's Volume VII.* The schematics and trimmer locations for the respective chassis will be found on these pages: Chassis 5516, schematic *page 7-7*, trimmers *page 7-2;* Chassis 5634, schematic *page 7-17*, trimmers *page 7-9;* Chassis 5707, schematic *page 7-18*, trimmers *page 7-11.*

Signal Generator Connection	*Signal Generator Frequency*	*Dial Position*	*Wave-Band Switch Position*	*Trimmer Number*	*Output Signal*
Det.-Osc. Control Grid	456 kc[1]	———	———	4 I-F Trimmers	Max.
Antenna	456 kc	———	———	Wave-Trap Trim. (Rear of chassis)	Min.
Antenna	6 mc	6 mc	Band B	Osc. Trim.[2]	———
Antenna	1400 kc	1400 kc	Band A	Broadcast Trim.[3]	———
				Antenna Trim.	Max.
Antenna	18 mc	18 mc	Band C	Short-Wave Trim.	Max.[3]
Antenna	600 kc	600 kc	Band A	Broadcast Pad.	Max.[3]
Antenna	1400 kc	1400 kc	Band A	Broadcast Trim.[3]	———
				Antenna Trim.	Max.

Note 1—Use smallest possible signal from generator to prevent AVC action from affecting output readings.
Note 2—Adjust for correct dial reading.
Note 3—While rocking.



TOLERANCES: ±.005" UNLESS OTHERWISE SPECIFIED.

BASIC PART NO. 4200

2 LUG TERMINALS

HOW TO ORDER: SPECIFY THE BASIC PART NUMBER WITH THE APPROPRIATE DASH NUMBER.

EXAMPLE: BASIC PART NO. 4200 — DASH NO. –0 THRU –8

DASH NO.	RECOMMENDED FREQ. MHz.	CORE PART NO.	CORE MATERIAL	BASIC POWDER	COLOR CODE
–0	FORM LESS CORE				
–1	.2 – 1.5	30-207-1		CARBONYL C	YELLOW
–2	1.0 – 20.0	30-207-2	POWDERED	CARBONYL E	RED
–3	20.0 – 50.0	30-207-3	IRON	CARBONYL J	GREEN
–4	50.0 – 200.0	30-207-4		IRN 9	WHITE
–5	100.0 & UP	30-207-5	BRASS		NONE
–6	2.0 – 40.0	30-207-6	POWDERED	CARBONYL TH	PURPLE
–7	40.0 – 300.0	30-207-7	IRON	CARBONYL SF	BLUE
–8	UNDER 25	30-207-8	FERRITE	Q1	NONE

COMPONENT		MATERIAL	FINISH
COIL FORM SOLDER LUG TERMINAL		NYLON BRASS	 CADMIUM PLATE .0003
TUNING CORE	BRASS	BRASS	RHODIUM FLASH OVER SILVER PLATE .0003
	POWDERED IRON	CORE. POWDERED IRON	MOISTURE PROOFED
MOUNTING CLIP		STEEL	CADMIUM PLATE .0003

NOTE: COILS CAN BE WOUND ON THIS FORM TO YOUR SPECIFICATIONS.

USED ON: STOCK	J. W. MILLER CO.	BASIC PART NO.
DWG BY W. E. K.	5917 SO. MAIN	
APP. BY W. R. C.	LOS ANGELES, CALIF.	4200
DATE: 10-26-65	SCALE: N. T. S. / DWG. NO. 4200-0-8	

Economy Adjustable R.F. Chokes

Through the use of a recently developed Nylon molding process we are able to offer an inexpensive line of adjustable chokes. These items feature a wide inductance range which has been achieved through the use of a threaded ferrite core. They can be adjusted from either the top or bottom. This lends a degree of flexibility to your design. Mounting is achieved by means of a metal clip in a 3/16" round hole or a special keyed hole. Instructions supplied with each coil.
Dimensions: 3/8"x1 3/8" long.

*Minimum self resonant frequency measured at maximum inductance.

Miller Part Number	Minimum Core Position			Maximum Core Position			R	Max.	Min.*	Dia.	
	Inductance Maximum	Q Min.	Test Frequency	Inductance Minimum	Q Min.	Test Frequency	Ohms Max.	Current Ma.	Fo. MHz.	over Winding	Turns
4201	.300 uh	75	25 MHz	.580 uh	64	25 MHz	.04	636	160	.375	4½
4201-A	.550 uh	78	25 MHz	1.10 uh	56	25 MHz	.05	636	112	.375	6½
4202	1.00 uh	73	25 MHz	2.50 uh	78	25 MHz	.15	400	78	.375	10½
4203	2.00 uh	56	7.9 MHz	5.50 uh	59	7.9 MHz	.19	400	54	.375	17½
4204	5.00 uh	72	7.9 MHz	12.0 uh	97	7.9 MHz	1.1	126	37	.375	28
4205	10.0 uh	33	7.9 MHz	25 uh	88	7.9 MHz	1.6	100	11	.406	33
4206	20.0 uh	45	2.5 MHz	55 uh	68	2.5 MHz	2.3	100	7.7	.406	46
4207	50.0 uh	42	2.5 MHz	140 uh	83	2.5 MHz	4.0	100	4.0	.406	80
4208	120 uh	49	.79 MHz	330 uh	80	.79 MHz	6.6	100	2.9	.437	126
4209	310 uh	44	.79 MHz	860 uh	40	.79 MHz	12	100	1.6	.468	204

USED ON: STOCK	J. W. MILLER CO. 5917 SO. MAIN LOS ANGELES, CALIF.	STANDARD PART NO.
DWG. BY W. E. K.		4201
APP. BY W. R. C.		THRU
DATE: 7-10-66	SCALE: N. T. S. DWG. NO. 4201-4209	4209

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HICKOK

INSTRUCTION MANUAL

for

MODEL 752A

DYNAMIC MUTUAL CONDUCTANCE TUBE TESTER

Manual No. 2490-582

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CHAPTER I - INTRODUCTION

GENERAL DESCRIPTION

The Hickok Model 752A Tube Tester combines the characteristics of accuracy and dependability together with the advantages of portability and simplicity of operation to meet the needs of those technicians who maintain modern electronic equipment. The design specifications of the Model 752A include the very latest tube-testing techniques to provide an accurate evaluation of the performance capabilities of electron-tubes of the receiving and low power transmitting types.

The Model 752A employs the Dynamic Mutual Conductance test method to evaluate electron tubes of the amplifier type. The results obtained from this test method are indicative of the performance capabilities of a tube in actual equipment operation. The dynamic mutual conductance of the tube under test is quantitatively indicated directly in micromhos on the test meter.

The Model 752A employs a controlled emission test to provide a meaningful evaluation of diode tubes of the rectifier and detector types. The instrument also provides a voltage regulator tube test circuit which permits the testing of voltage regulator tubes in accordance with tube manufacturers' handbook operating conditions.

To insure a complete evaluation of the tube under test, the Model 752A provides three basic fringe tests: (1) An interelement short and leakage test is provided as a preliminary check on all electron-tubes. The resistance of interelement leakage paths is measured directly in ohms on the test meter. (2) A gas test is also provided; this test is an integral step in the evaluation of any amplifier type tube. (3) A life test, which determines the efficiency of the cathode, is provided to forecast the future life of the tube under test.

The outstanding feature of the Model 752A is the dual tube test which permits the testing of electron-tubes containing electrically similar sections with one setting of the selector switches. Each section of the tube is independently tested for interelement leakage, performance capability, and gas by simply depressing an additional push button which transfers the tube test conditions from one section of the tube to the other. This feature is particularly useful when testing and selecting tubes for use in balanced circuits.

Many new mechanical design features have been incorporated into this tester to facilitate the rapid selection of the proper test conditions for the tube under test. The panel layout is designed to provide a direct correlation between the order in which the roll chart data is presented and the order in which the tube-test selector switches are arranged. This arrangement not only reduces the time needed for testing a tube, but also reduces the possibility of operator-error in setting up the specific tube test conditions. To further reduce the time normally required in testing tubes and to aid in the interpretation of test results, the test meter scales have been simplified. Mutual conductance values are indicated on one basic 0-1500 micromho scale. The Gm of the tube under test can be determined by multiplying the indicated meter reading by the multiplier selector switch setting. Separate meter scales are provided for the interelement leakage and voltage regulator test circuits.

The Model 752A also makes available on its main panel ten of the most commonly used tube sockets. The various tube parameters are applied to the pins of these tube sockets through anti-oscillation wiring by a system of rotary selector switches. These selector switches are numbered in accordance with the EIA system of tube pin designation, and are wired in such a way that they are electrically interlocked to prevent the application of two different test potentials to the same tube pin. This not only prevents damage to the tube under test, but also prevents damage to the tester.

The following special tube adapters are available for use with the Model 752A:

NOMENCLATURE	HICKOK CODE NO.
Adapter: Cathode ray tube	1050-28
Adapter: 2C39C tube	1050-50
Adapter: Long-lead submin. tube	1050-89
Adapter: 829B tube	1050-107
Adapter: 4X150A/4X250B tube	1050-109
Adapter: 991 tube	1050-118
Adapter: 2C36 tube	1050-119
Adapter: 2-01C tube	1050-120
Adapter: 6263, 6173, 5675 pencil tubes	1050-121

The built-in roll chart provides the test data for all the tubes normally encountered in the servicing of modern electronic equipment. The roll chart is replaceable, and revised roll charts can be ordered direct from the factory. (See page 3).

Detailed information on the physical and electrical properties of the Model 752A can be found in the Specifications Section.

To ensure safe, accurate and efficient service from your tube tester, Chapter II (Operating Instructions), should be carefully read and understood.

MODIFICATION TO 230-VOLT OPERATION

The Model 752A Tube Testers, beginning with tube testers bearing serial numbers prefixed with 324 and above, are designed to operate on either 115 volts or 230 volts. They are shipped from the factory to operate on 115 volts. If 230-volt operation is desired, it is necessary to change the wiring of the power transformer from a parallel hookup to a series hookup. For 115-volt operation, no modification is necessary. For parallel and series hookups, see the schematic wiring diagram in the rear of this manual.

For modification of the Model 752A Tube Tester from 115 volts to 230 volts, proceed as follows:

a. POWER TRANSFORMER

1. Disconnect the black wire which is connected to the lug marked (w), and disconnect the white-black wire which is connected to the lug marked (x). Both located on transformer.

2. Splice together and solder the two above wires. Insulate connection with electrical insulating tape.

3. Do not disturb other wires which are connected to the lugs marked (w) and (x). Inspect (w) and (x) for good electrical connection.

b. LINE FUSE

1. Replace the No. 81 fuse lamp with a No. 63 lamp.

c. CALIBRATION

1. Plug tube tester into a 230-volt a. c. power source and turn on.

2. Rotate LINE ADJUST until the needle on the meter is in the area marked LINE TEST.

3. No further calibration is necessary.

d. For modification from 230 volts to 115 volts, reverse the above procedure.

SPECIFICATIONS

I POWER REQUIREMENTS:

A.	Voltage:	115 volts or 230 volts.
B.	Frequency:	50 - 60 Hz.
C.	Power Consumption:	40 watts, minimum. 70 watts, maximum.
D.	Protection:	Line fuse (#81 lamp), for 115-volt operation. Line fuse (#63 lamp), for 230-volt operation. Bias fuse (#49 lamp).

II TUBE-TEST POTENTIALS:

A.	Plate Voltages:	75 and 150 volts d. c.
B.	Screen Voltages:	56 and 130 volts d. c.
C.	Fixed Bias Voltages:	0 to -40 volts d. c., adjustable.
D.	Extra Negative Voltage:	-40 volts d. c.
E.	Provisions for Self-bias Tests.	
F.	Signal Voltages:	0.25, 0.5, 1.25, 2.5 volts a. c., 60 cycles.
G.	Diode Test Voltage:	20 volts RMS.
H.	V. R. Tube Test Voltages:	0-200 volts d. c., adjustable.
I.	0Z4 Test Voltage:	287 volts RMS.
J.	Filament Voltages:	0-117 volts a. c. (18 steps)

III TEST METER:

A.	Mutual Conductance Ranges:	0-1500/3000/6000/15,000/30,000μ mhos (Readings obtained from basic 0-1500 Gm scale and multiplier switch.)
B.	V. R. Test Scales:	0-200 volts d. c. 0-100 milliamperes.
C.	Leakage Scale:	Calibrated in ohms.

IV TUBE COMPLEMENT:

Quantity	Type
1 ea.	83
1 ea.	5Y3GT/G

V PHYSICAL SPECIFICATIONS:

A.	Height:	7-1/2"
B.	Width:	18-3/8"
C.	Depth:	16-3/4"
D.	Weight:	25 lbs.
E.	Case:	Portable, black leatherette covered.

ROLL CHART SUBSCRIPTION SERVICE: Roll charts for Hickok Tube Testers are up-dated twice a year. By subscribing to the roll chart service, you will automatically receive each new chart as it comes from the printer. For details on this subscription plan, contact the Parts Department, Hickok Electrical Instrument Company, 10514 Dupont Avenue, Cleveland, Ohio 44108.

TUBE DATA SUPPLEMENTS: Also available twice a year are up-to-date data on Foreign Tube Types and Obsolete Tube Types. Each of these manuals may be purchased on a per-issue basis from the Parts Department.

Don't allow your tester to become obsolete due to outdated information. Take advantage of these services, now.

CHAPTER II - OPERATING INSTRUCTIONS

SECTION I: PANEL COMPONENTS - IDENTIFICATION AND FUNCTION.

A. THE CONTROLS:

1. The POWER ON-OFF switch controls power input to Model 752A.

2. The LINE ADJUST controls the input voltage to the power transformer for proper standardization of test potentials applied to the tube under test.

3. The FILAMENT VOLTAGE switch provides an 18-step selection of filament or heater voltages from 0.6 volts through 117 volts a. c. An OFF position is also provided for use when testing V. R. tubes and cold cathode rectifiers.

4. Selector switches, FILAMENT (2), GRID A, GRID B, PLATE, SCREEN, CATHODE, and SUPPRESSOR, provide proper switching of the internal circuits to apply the correct test potentials to the various pins of the tube under test.

5. The BIAS control is used to adjust the bias voltage applied to the tube under test.

6. The SHUNT control is a dual potentiometer used to adjust the sensitivity of the meter circuit to the proper level required for testing rectifier and detector type diodes.

7. The MULTIPLIER switch is used to select the proper meter range for the particular type of tube under test. For mutual conductance tests, the MULTIPLIER switch is set to the X1, X2, X4, X10 or X20 position. This extends the full scale range of the basic 0-1500 micromho scale to 3000, 6000, 15,000 and 30,000 micromhos, respectively. For controlled emission tests on rectifier and detector type diodes, the MULTIPLIER switch is set to the SH or shunt position. This connects the SHUNT potentiometer into the circuit, and this control should then be set to the value indicated on the roll chart. For voltage regulator tests, the MULTIPLIER switch is set to the V. R. position. In the V. R. position, the test meter becomes a 0-200 VDC voltmeter, and when S-9 is depressed the test meter becomes a 0-100 milliammeter.

8. The LEAKAGE switch, when rotated through positions 1, 2, 3, 4, 5 and 6, connects the various elements of the tube under test across a test voltage. In certain positions of the LEAKAGE switch, tubes having interelement leakage paths will complete the test circuit and cause the pointer of the test meter to move up scale.

9. The ten push-button switches located in the lower right-hand portion of the panel actuate the proper test circuit, as indicated on the roll chart. Their designation and function is as follows:

   a. S1 - DIODE: used when testing low-power diodes, such as the 6H6.
   b. S2 - 0Z4: used when testing cold cathode rectifiers, such as the 0Z4.
   c. S3 - RECT: used when testing rectifiers, such as the 5Y3, 6X4, etc.
   d. S4 - LOW PLT: used when testing amplifier type tubes, such as the 1R5 and 1S4.
   e. S5 - RED GM: push button for mutual conductance test on amplifier tubes only. NEVER USE THIS BUTTON WHEN TESTING RECTIFIER TUBES.
   f. S6 - GAS #1, and S7 - GAS #2: used when making gas test on amplifier tubes.
   g. S8 - PLT #2: used when testing multiunit tubes with electrically similar sections. By depressing S8, the test conditions are transferred from one section of the tube to the other; thus, each section can be independently evaluated.
   h. S9 - VR MILS: this switch converts the test meter into a 0-100 milliammeter during the V. R. tests.
   i. S10 - LINE: used in conjunction with the LINE TEST point on the meter to standardize tube test potentials.

10. The VR VOLTAGE adjust is used to control the voltage applied to voltage regulator tubes during a V. R. test.

11. The LIFE TEST switch is used when making a reserve life test on a tube. When this switch is pressed, the filament voltage of the tube under test is reduced by approximately 10% of its normal value. The efficiency of the cathode of the tube under test can then be evaluated and the future life of the tube approximated.

B. The TEST METER gives a quantitative indication of the tube-test results on three separate scales.

1. The LEAKAGE scale is calibrated in ohms. Interelement leakage paths up through 10 megohms can be measured.

2. The MICROMHOS scale is used to give a quantitative indication of the results of the Gm, Emission, and Gas tests. The range of the basic 0-1500 micromho scale is extended by use of the MULTIPLIER switch. The readings obtained on this scale, when compared with the MINIMUM MUT. COND. column of the roll chart, are indicative of the performance capabilities of the tube under test.

3. The VOLTS-MILS scale is calibrated in d. c. volts and milliamperes. During V. R. tests, it indicates the striking, operating and regulating

voltage of the V. R. tube, along with the current range over which the tube is regulating.

C. The TEST SOCKETS are located along the upper edge of the panel and to the left of the test meter. The 15 tube sockets provided will accommonate the following tube-types: In-line and 8 pin Subminiatures, Octal, Loktal, 7 pin Miniature, 4, 5, 6 and 7 pin Standard, Acorn, and 9/10 pin miniature, 5 pin Nuvistor, 7 pin Nuvistor, Compactron and Novar.

D. LEADS, LAMPS and CONNECTIONS:

1. Two TEST LEADS are provided to make connections from the G, P and K panel jacks to the top caps of tubes as required. When the leads are not in use, they can be stored in the lead compartment at the top of the case.

> The LINE FUSE lamp serves both as a protective device and an overload indicator. This lamp will light brightly when an overload is placed on the tester or the tube under test. When this occurs, turn OFF the equipment immediately. The LINE FUSE lamp (#81 or #63, depending upon the input voltage) is mounted in the upper left-hand portion of the main panel, where it is readily visible.

3. The BIAS FUSE lamp is connected into the bias supply circuit. It serves as a protection for the bias potentiometer in case an attempt is made to test a shorted tube. A burned-out BIAS FUSE lamp will result in the failure of the test meter to read when the Gm button is pressed. The BIAS FUSE lamp (#49) is mounted in the upper left-hand portion of the main panel, where it is readily visible.

4. One red and two black jacks, marked P, G and K, respectively, provide connections for the test leads necessary to test tubes with top cap connections.

5. The EXT. SELF BIAS RES. jacks provide the means of making self bias tests. IMPORTANT- the shorting link across the SELF BIAS terminals must be in place when these terminals are not in use.

E. TUBE TEST DATA:

1. All information necessary for properly setting the tube test controls for the various tube types is tabulated on the roll chart in nine columns under the following headings, reading from left to right:

a. TUBE TYPE: All currently available type numbers for the tubes which the Model 752 is designed to test are listed numerically in this column, starting with type 0A2 and continuing through type AX9903.

b. FILAMENT: Correct filament or heater voltages for the tube type to be tested are shown in this column. The FILAMENT VOLTAGE switch must be adjusted BEFORE inserting a tube in any of the test sockets.

c. SELECTORS: The tube pin selectors FILAMENT (2), GRID A, GRID B, PLATE, SCREEN, CATHODE and SUPPRESSOR are to be set in accordance with the two groups of four digit numbers appearing in this column. For example, the selector settings for the 12AT7 are listed as 4572-6183; the selectors are set as follows:

SELECTOR	POSITION NO.
FILAMENT	4
FILAMENT	5
GRID A	7
GRID B	2
PLATE	6
SCREEN	1
CATHODE	8
SUPPRESSOR	3

d. BIAS: This column lists the proper settings for the BIAS dial which controls the bias voltage applied to the tube under test.

e. SHUNT: This column lists the settings for the SHUNT dial which controls the sensitivity of the meter circuit. Adjustment of this dial is only required when the MULTIPLIER switch is in the SH position.

f. MULT: This column lists the position to which the MULTIPLIER switch should be set to provide the proper meter range for the type of tube under test.

g. PRESS: This column lists the proper push button switches to be pressed to complete the various test circuits applicable to the tube under test.

h. MINIMUM MUT. COND: In this column are the minimum mutual conductance rejection values for amplifier tubes and amplifier sections of multi-purpose tubes. The rejection values for rectifier and detector type diodes are also listed in this column, along with the nominal operating voltage for V. R. tubes.

i. NOTATIONS: Listed in this column is special information applicable to the tube under test.

SECTION II: GENERAL OPERATING PROCEDURES

A. PRELIMINARY PROCEDURES:

1. Remove the line cord from the lead compartment and connect its plug into a power outlet of either 115 volts or 230 volts, 60 cycles, depending upon the mode of operation. See the instructions on pages two and three for the

correct hook-up of 115-volt operation or 230-volt operation. NEVER CONNECT THIS EQUIPMENT TO A DC POWER SOURCE.

> CAUTION
>
> DO NOT INSERT TUBE TO BE TESTED INTO TEST SOCKET UNTIL CORRECT SETTING OF ALL CONTROLS HAS BEEN MADE IN ACCORDANCE WITH THE FOLLOWING STEPS.

2. Operate the thumb gear which turns the roll chart mechanism until the tube number of the tube to be tested appears in the roll chart window. A red index line aids in selecting correct data line from the roll chart.

3. Turn the knob of the FILAMENT VOLTAGE switch to the voltage indicated on the roll chart under the heading FIL.

4. Set the eight tube pin selector switches in accordance with two groups of four digit numbers appearing in the column headed SELECTORS.

   The selector switches are electrically interlocked in such a way that it is impossible to connect two different voltages to the same tube pin at the same time. Accidental shorts are thus avoided.

5. Set the BIAS dial to the numerical setting listed on the roll chart under the heading of BIAS.

6. Set the SHUNT dial to the numerical setting listed on the roll chart under the heading of SHUNT. If no setting of this dial is required, a short dotted line will appear in the column.

7. Set the MULTIPLIER switch to the position indicated on the roll chart.

8. Set the LEAKAGE switch to the TUBE TEST POSITION.

9. Insert the tube to be tested into the proper test socket, and if applicable, make top cap connection as called for in NOTATIONS column of the roll chart.

10. Set the POWER ON-OFF to the ON position.

    NOTE: ALLOW SUFFICIENT TIME FOR THE TUBE UNDER TEST TO REACH ITS OPERATING TEMPERATURE BEFORE PROCEEDING.

11. LINE TEST: Depress push button S10 and rotate the LINE ADJUST control until the test meter pointer indicates to the line marked "Line Test".

B. THE LEAKAGE TEST PROCEDURES:

1. Rotate the LEAKAGE switch from position number 1 through position number 6, while tapping the tube lightly with your finger and watching the test meter for pointer deflection.

   Tubes having interelement shorts and leakage paths will cause the meter pointer to move up scale in various positions of the LEAKAGE switch. A momentary deflection of the test meter pointer when the LEAKAGE switch is turned from one position to the next should be disregarded. These meter pointer deflections are caused by the charging of a capacitor in the leakage test circuit. Intermittent meter pointer deflections as a result of tapping the tube indicate loose elements which may cause noisy or erratic tube operation.

   A leakage resistance of 10 megohms will cause the meter pointer to begin to indicate. A complete interelement short will cause the pointer to deflect full scale to give a zero ohms reading. The top scale of the meter is the LEAKAGE scale, and it is calibrated in ohms such that the resistance of leakage paths up to 10 megohms can be read directly from the scale.

2. A shorted tube or one with excessive interelement leakage should be discarded with no further testing.

3. Multisection tubes containing dissimilar sections, such as the 6CG8, should be tested for shorts and leakage on both sections.

4. Multisection tubes containing electrically similar sections, such as the 6J6, can make use of the DUAL TEST circuit.

   FOR EXAMPLE: For dual triodes, make the normal leakage test as described in step 1 of part (B); then depress push button S8 and repeat the leakage test for the second section.

5. Table No. 1: Leakage Test Chart, is to be used for identifying interelement leakage paths. In Table No. 1 an (X) under any LEAKAGE switch position represents a meter pointer deflection in that position; thus, by referring to the Leakage Path column of Table No. 1, the defective elements can be identified.

6. The circuit used in testing dual triodes is such that the SCREEN selector is used as the plate of the second section, and the SUPPRESSOR selector is used as the cathode of the second section. Thus, plate to plate and cathode to cathode, shorts or leakages will be identified on the Leakage Test Chart as plate to screen and cathode to suppressor shorts or leakages.

7. Some tubes will show a shorted condition on certain positions of the LEAKAGE switch even though they are good tubes. These positions are noted in the NOTATIONS column of the roll chart. That is, "Short on 1 and 2" means that a short indication on positions 1 and 2 is normal.

C. MUTUAL CONDUCTANCE (Gm) TEST: This is the basic quality test for tubes used as amplifiers.

TABLE NO. I: LEAKAGE TEST CHART

LEAKAGE PATH	LEAKAGE SWITCH POSITIONS					
	1	2	3	4	5	6
HEATER - CATHODE	X	X				
HEATER - GRID A			X	X	X	
HEATER - GRID B			X	X	X	X
HEATER - SCREEN			X			
HEATER - SUPPR.		X				
HEATER - PLATE			X	X		
CATH. - GRID A	X	X	X	X	X	
CATH. - GRID B	X	X	X	X	X	X
CATH. - SCREEN	X	X	X			
CATH. - SUPPR.	X					
CATH. - PLATE	X	X	X	X		
GRID A - GRID B						X
GRID A - SCREEN				X	X	
GRID A - SUPPR.		X	X	X	X	
GRID A - PLATE					X	
GRID B - SCREEN				X	X	X
GRID B - SUPPR.		X	X	X	X	X
GRID B - PLATE					X	X
SCREEN - SUPPR.		X	X			
SCREEN - PLATE				X		
SUPPR. - PLATE		X	X	X		

After the controls are properly set in accordance with the roll chart data as outlined in Part A of this section and the tube has been tested for leakage in accordance with Part B of this section, proceed as follows:

1. Set the LEAKAGE switch to the TUBE TEST position.

2. Recheck LINE ADJUST TEST and reset if necessary.

3. Press the Gm push button S5 and observe the test meter indication.

4. Compare the numerical value of the meter reading on the 0-1500 scale with the minimum acceptable value listed on the roll chart under the column headed MINIMUM MUT. COND.

5. The meter reading can be read directly in micromhos through the use of the MULTIPLIER setting and the basic 0-1500 micromho scale.

   NOTE: On special types of amplifier tubes, the push buttons to be used may vary with the particular tube type under test. Always refer to the roll chart for the correct push buttons to use.

D. GAS TEST: The push buttons S6 and S7 are used to test an amplifier tube for gas content. After the tube under test has been tested for Gm, proceed as follows:

1. Set the MULTIPLIER switch to the X2 position. This extends the Micromho Scale to the 0-3000 range.

2. Turn the BIAS dial full clockwise to indicate 100.

3. Depress push button S6 and hold in the down position while adjusting the BIAS dial until the pointer of the meter indicates 100 micromhos on the 0-3000 range.

4. Hold down S6 and depress push button S7 while observing the meter pointer.

5. If the tube contains gas, the pointer of the meter will move up scale. If the pointer movement is not more than two small scale divisions, the gas content is negligible.

6. With some tubes, such as the Type 45, the micromho reading cannot be brought down to 100 micromhos by turning the BIAS dial. In such cases, turn the BIAS dial clockwise to 100. Test for gas by noting whether the pointer moves more than two divisions up scale when S6 is held down and S7 is depressed.

7. Some tubes will give an indication of gas only after they have been operating for a period of time. If a tube is suspected of being gassy, allow it to heat for a few minutes.

E. RESERVE LIFE TEST: This test is used to approximate the future life of the tube. After the mutual conductance test has been made as previously described, proceed as follows:

1. Set the MULTIPLIER switch to the SH position.

2. Turn the SHUNT dial full clockwise to indicate 100.

3. Depress push button S5 and hold in down position while adjusting the SHUNT dial until the meter pointer indicates to 1000 on the 0-1500 scale.

4. Hold down S5 and depress the LIFE TEST switch. This switch reduces the filament voltage applied to the tube under test.

5. If the meter reading remains above mid-scale, the reserve life of the tube under test may be considered satisfactory.

F. RECTIFIER TUBE TEST: Rectifier tubes, including diode tubes and diode sections of multisection tubes, are tested for emission characteristics, since they have no mutual conductance characteristic. The push button switches S1, S2 and S3 are used to test various types of rectifiers and detector diodes.

1. The push button switch S1 is used when testing detector diodes. This switch supplies a test voltage sufficiently low in magnitude so as not to damage the delicate cathode of the diode under test.

2. The push button S2 is used when testing cold cathode rectifiers such as the 0Z4. This switch applies a test voltage sufficiently high to ionize the tube and start conduction.

3. The push button S3 is used when testing rectifier tubes such as 5Y3. This switch applies a test voltage of sufficient magnitude to reveal the defects in this type of tube.

G. DUAL TEST: For multisection tubes containing electrically similar sections, the notation DUAL TRIODE or DUAL DIODE will appear in the NOTATIONS column of the roll chart. When the dual test is called for, the following procedure is applicable:

1. DUAL TRIODE: After the controls are properly set in accordance with the roll chart data as outlined in Part A of this section, proceed as follows:

   a. Rotate the LEAKAGE switch from position 1 through position 6 and observe the test meter for indications of leakage paths.

   b. Depress push button S8 and repeat the leakage test for the second section of the tube.

   c. Set the LEAKAGE switch to the TUBE TEST position.

d. Depress push button S5 - Gm, and observe the test meter for an indication of the Gm of the first section. Release S5.

e. A Gas Test for the first section should be performed as described in Part D of this section.

f. After the first section has been completely tested, depress push button S8 and hold in down position while S5 is again depressed and the second section of the tube under test is checked for Gm.

h. During testing of each section of the dual triode, the grid of the unused section is kept at cut-off bias by the extra negative bias supply.

2. DUAL DIODE: The testing of dual diodes is performed as described above, with two exceptions:

a. The diode test push button (S1, S2 or S3) as called for in the PRESS column of the roll chart is to be used in conjunction with S8.

b. The Gas Test is not applicable to diodes and rectifiers.

H. SPECIAL TUBE TYPES:

1. Voltage Regulator Tubes: The voltage regulator test circuit permits the testing of V. R. tubes under actual operating conditions. The V. R. test circuit measures the voltage drop across the tube under test; hence, the striking voltage and the voltage drop for minimum and maximum load currents can be read directly in volts on the test meter.

With the MULTIPLIER switch in the V. R. position, the VR VOLTAGE dial controls the magnitude of the test voltage applied to the tube. The push button switch S9 converts the test meter from a voltmeter to a milliammeter. The bottom scale of the meter is used to evaluate the results of the V. R. test. This scale is calibrated in VOLTS (0-200 v. d. c.) and MILS (0-100mA d. c.).

For example, the 0A3:

a. Set the FILAMENT voltage switch to the OFF position.

b. Set the tube pin selector switches to 0000-5020.

c. Set the MULTIPLIER switch to the V. R. position.

d. Turn the VR VOLTAGE control fully counterclockwise.

e. Turn the LINE ADJUST control fully clockwise.

f. Insert the 0A3 into its proper test socket and turn the tester ON.

g. In the NOTATIONS column for the 0A3 is the voltage value 100V with a star in front of it. This notation represents the approximate starting voltage for the V. R. tube. In the column MINIMUM MUT. COND. is the voltage value 75V. This represents the nominal operating voltage for the V. R. tube.

h. Rotate the VR VOLTAGE control slowly clockwise. The meter pointer should begin to indicate. The voltage value is read on the 0-200 volts scale.

i. When the meter indicates approximately 100 volts, the tube should fire. This will cause the meter pointer to hesitate and drop back to the operating voltage value of the tube under test. In the case of the 0A3, it is 75V.

j. Depress push button S9 - VR MILS. This converts the test meter from a voltmeter to a milliammeter, and it should indicate approximately 5mA on the 0-100 MILS scale.

k. While holding S9 in the down position, continue to rotate the VR VOLTAGE control clockwise until the test meter indicates 40mA.

l. Release S9 and read the voltage indicated on the test meter. For a good 0A3, the operating voltage should not have risen more than 5 volts above the nominal operating voltage.

2. Certain pentode tubes, such as the 6AJ5, require a low screen voltage and a normal plate voltage during test. This is accomplished by holding down S1 and pressing S5. When applicable, a note is printed on the roll chart under the heading of NOTATIONS: HOLD DOWN S1 AND PRESS S5.

3. Cathode-Ray Tube Test. With the use of the Hickok CRT Adapter, magnetic or electrostatic type T. V. picture tubes having a small shell duo-decal base can be given an interelement leakage test, a cathode emission test, a control grid test and a gas test.

a. Preliminary Instructions:

(1) Remove the socket from the cathode-ray tube to be tested.

(2) Affix the CRT Adapter to the tube to be tested.

(3) Attach the red lead to the No. 2 anode of the tube under test.

(4) Insert the 8 pin plug on the cable of the CRT Adapter into the octal tube test socket on the main panel of the Model 752A.

b. Cathode Emission Test.

(1) Set the selectors and dials as follows:

FIL	SELECT.	BIAS	SH	MULT	PRESS	MIN. MUT. COND.
6.3	7230-5084	0	75	SH	S1	650

(2) Make an interelement leakage test by rotating the LEAKAGE switch through positions 1 through 6.

(3) Set the LEAKAGE switch to the TUBE TEST position.

(4) Depress S1 and observe the test meter indication. A good tube should read above the recommended reject value noted above.

c. Grid Control and Gas Test.

(1) Set the selectors and dials as follows:

FIL	SELECTORS	BIAS	SHUNT	MULT	PRESS
6.3	7250-3084	*	0	SH	S6

(2) Make an interelement leakage test as described above.

(3) Set the LEAKAGE switch to the TUBE TEST position.

(4) * Hold down S6 and rotate the BIAS dial. If the control grid is functioning, the meter pointer will move up and down scale.

(5) Gas Test: Adjust BIAS control until the test meter reads one small scale division. Hold down S6 and depress S7.

If the meter pointer moves up scale more than one division, the tube is gassy.

The Hickok CRT Adapter (Code No. 1050-28) is available through Hickok distributors.

J. DIODE TESTING:

1. Silicon of Germanium Diodes are tested for their rectification quality. To test these types on the Model 752A Tube Tester, proceed as follows:

a. Set the FILAMENT switch to the OFF position.

b. Set the tube pin selector switches to 0000-6030.

c. Set the LEAKAGE switch to the TUBE TEST position.

d. Set the BIAS control to 0.

e. Set the MULTIPLIER switch to the SH position.

f. Set the SHUNT control to the 65 dial mark.

g. Connect the cathode lead of the diode to pin 3 of the octal test socket and the anode lead of the diode to pin 6 of the octal test socket. (If more convenient, the grid and plate leads supplied with the tester may be used to make these connections.)

h. Place the POWER ON-OFF switch to the ON position and make line test in the usual manner.

i. Depress push button S3 and observe the test meter. The test meter reading should be above 650 to indicate a good diode. A zero test meter reading indicates that the diode is either shorted or open. NOTE: If the test meter indicates down scale, reverse the diode leads and repeat this step.

CHAPTER III
PARTS LIST

Reference designations have been assigned to identify all parts used in this instrument. An asterisk designates a part which should be replaced by authorized Hickok repair stations or factories. It is therefore recommended that the entire instrument be returned for repair if trouble exists with such a part.

In ordering parts, refer to the current parts price list for this instrument. Prices are subject to change without notice, and the minimum billing charge is $3.50.

REF. DESIG.	NAME AND DESCRIPTION	HICKOK PART NO.
A1	DIAL ASSEMBLY: SHUNT	4160-66
A2	DIAL ASSEMBLY: BIAS	4160-67
A3	INDEX ROLLER ASSEMBLY	9600-42
C1	Not assigned	
C2	CAPACITOR, FIXED, PLASTIC: .5 uf, 200 volts	3105-206
C3	CAPACITOR, FIXED, PLASTIC: .1 uf, 200 volts	3105-210
C4	CAPACITOR, FIXED, ELECTROLYTIC: 8 uf, 350 volts	3085-68
C5	CAPACITOR, FIXED, ELECTROLYTIC: 50 uf, 6 volts	3085-45
C6	CAPACITOR, FIXED, CERAMIC: .005 uf, -0 +100%, disc type	3110-7
CR1	RECTIFIER: full wave, copper oxide	18150-42
CR2	CRYSTAL: SC91	3870-41
DS1	LAMP: Roll chart, 7 watt, 115 volts	12270-41
DS1	LAMP: #10S6/10, clear, 10W, 230V, used on roll chart for 230 V operation	12270-59
DS2, DS3	LAMP: #51 supplied with meter	
E1	BAR: shorting	2145-2
F1	LAMP: #81 auto tungsol, bayonet base (LINE FUSE) for 115 V operation	12270-2
F1	LAMP: #63 bayonet base for 230 V operation	12270-58
F2	LAMP: #49 pilot, bayonet base, (BIAS FUSE)	12270-17
M1	METER: Model 68	680-303
MP1	BUTTON: push, black	2920-7
MP2	BUTTON: push, red	2920-8
MP3	BUTTON: push, green	2920-13
MP4 thru MP15	KNOB: phenolic, black	11505-55
MP16	KNOB: machined, bar type, with white dot and pointer	11500-11
MP17 thru MP23	Same as MP1	
P1	CORD: AC line	3675-34
J1	JACK: pin plug type, red, (PLATE)	10300-1
J2	JACK: pin plug type, black, (GRID)	10300-2
J3, J4	BINDING POST	2360-51
J5	Same as J2, (CATHODE)	
R1	RESISTOR: 100 ohms, 10%, 10 watt, center tapped	18575-19
R2	RESISTOR, FIXED: 215K ohms, 1%, 1/2 watt	18537-61
R3	RESISTOR, FIXED: 270 ohms, 5%, 1/2 watt	18411-271
R4	Not assigned	
R5	POTENTIOMETER: 50K ohms, screw driver slot	16925-473
R6	RESISTOR, FIXED: 200 ohms, 1%, 2 watt	18540-5
R7	Same as R1	
R8	RESISTOR, FIXED: 180K ohms, 10%, 1/2 watt	18414-182
R9	RESISTOR, FIXED: 2 megohms, 5%, 1/2 watt	18415-201
R10	POTENTIOMETER: 500 ohms	16925-376
R11	RESISTOR, FIXED: 470K ohms, 1%, 1/2 watt	18537-66
R12	RESISTOR, FIXED: 470 ohms, 5%, 2 watt	18431-471
R13	RESISTOR, FIXED, FILM: 10 ohms, 1%, 1/2 watt	18537-217
R14	RHEOSTAT: 10,000 ohms, 50 watt	18750-26
R15	RESISTOR, FIXED: 2920 ohms, 1%, 1/2 watt	18537-67
R16	RESISTOR, FIXED: 1200 ohms, 10%, 1 watt	18422-122
R17	RESISTOR, FIXED: 1800 ohms, 10%, 10 watt	18575-12
R18	RHEOSTAT: 350 ohms, 25 watt	18750-37
R19	RESISTOR, FIXED: 12 ohms, 1%, 1/2 watt	18537-59
R20	POTENTIOMETER: 50 ohms	16925-271
R21	RESISTOR, FIXED: 119 ohms, 1%, 1/2 watt	18537-62
R22	RESISTOR, FIXED: 47 ohms, 10%, 1/2 watt	18410-472
R23, R24	RESISTOR, FIXED: 41 ohms, 1%, 1/2 watt	18537-60

REF. DESIG.	NAME AND DESCRIPTION	HICKOK PART NO.
R25	RESISTOR, FIXED: 15,000 ohms, 5%, 1 watt	18423-151
R26	Same as R21	
R27	RESISTOR: wire wound, 8500 ohms, 10%, 10 watt	18575-89
R28	POTENTIOMETER: adjusted, 3000 ohms	16926-5
R29, R30	POTENTIOMETER: 150-150 ohms, wire wound	16925-90
R31	RESISTOR, FIXED: 500 ohms, 1%, 1/2 watt	18537-58
R32	RESISTOR, FIXED: 250 ohms, 1%, 1/2 watt	18537-63
R33	RESISTOR, FIXED: 150 ohms, 1%, 1/2 watt	18537-64
R34, R35	RESISTOR, FIXED: 50 ohms, 1%, 1/2 watt	18537-65
R36	RESISTOR, FIXED: 200K ohms, 1%, 1/2 watt	18537-46
R37	RESISTOR, FIXED: 1000 ohms, 10%, 1/2 watt	18412-102
S1	SWITCH: push type, (DIODE)	19910-132
S2	Same as S1 (OZ4)	
S3	Same as S1 (RECT)	
S4	Same as S1 (LOW PLATE)	
S5	Same as S1 (Gm)	
S6	Same as S1 (GAS 1)	
S7	Same as S1 (GAS 2)	
S8	Same as S1 (PLATE 2)	
S9	Same as S1 (VR MILS)	
S10	Same as S1 (LINE ADJ)	
S11	SWITCH: toggle, S. P. S. T.	19911-9
S12	SWITCH: push button, D. P. D. T. (LIFE TEST)	19910-118
S13	SWITCH, ROTARY: 2 section, 3 pole, 20 position (FILAMENT)	19912-386
S14	SWITCH, ROTARY: 1 section, interlocking, 14 position (FILAMENT)	19912-477
S15	Same as S14 (FILAMENT)	
S16	Same as S14 (GRID A)	
S17	Same as S14 (GRID B)	
S18	Same as S14 (PLATE)	
S19	Same as S14 (SCREEN)	
S20, S21	SWITCH, ROTARY: 1 section, 14 position (CATHODE)	19912-469
S22	SWITCH, ROTARY: 5 section, 7 position (MULTIPLIER)	19912-374
S23	SWITCH, ROTARY: 5 section, 7 position (LEAKAGE)	19912-373
T1	TRANSFORMER: power	20800-304
V1	TUBE: #83	20875-28
V2	TUBE: #5Y3GT/G	20875-6
W1	LEAD ASSEMBLY:	12450-145
W2	LEAD ASSEMBLY:	12450-180
XDS1	SOCKET: bayonet, small	19350-1
XF1	SOCKET: bayonet, miniature	19350-203
XF2	SOCKET: candelabra	19350-2
XV1	SOCKET: wafer, octal	19350-156
XV2	SOCKET: wafer, 4 pin	19350-157
X1	SOCKET: 4 pin	19350-93
X2	SOCKET: 5 pin	19350-94
X3	SOCKET: 6 pin	19350-95
X4	SOCKET: 7 pin	19350-270
X5	SOCKET: 8 pin octal	19350-97
X6	SOCKET: 8 pin, loctal	19350-99
X7	SOCKET: 7 pin	19350-136
X8	SOCKET: acorn, 7 contact	19350-43
X9	SOCKET: 10 pin	19350-364
X10, X11	SOCKET: combination, 7-8 pin (sub-miniature and in-line)	19351-16
X12	SOCKET: Nuvistor, 5 pin	19350-336
X13	SOCKET: 9 pin	19350-367
X14	SOCKET: Compactron	19350-365
X15	SOCKET: Nuvistor, 7 pin	19350-382
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CHAPTER IV - CORRECTIVE MAINTENANCE

A. Line Voltage

1. Check the line voltage from the power source using an ac voltmeter of suitable range.

2. The Model 752 is designed to operate on line voltage from 105 to 125 volts ac at frequencies from 50 to 60 cycles per second.

3. Low line voltage may make it impossible to adjust the meter to LINE TEST as required for proper voltage standardization within the equipment and impair the accuracy of the tester.

B. Line Fuse

1. One side of the primary circuit of the power transformer, T1, is protected by a combination LINE FUSE lamp and overload indicator, a type 81 lamp.

2. If the Roll Chart and Meter Illumination do not glow when the tester is connected and turned on, remove the LINE FUSE lamp and check it for continuity using a low range ohmmeter.

C. Roll Chart and Meter Illumination Lamps

1. Both the Roll Chart and the Meter should be illuminated when the tester is turned on.

2. If the METER LAMPS do not light, turn the tester OFF and remove the small cover located on the front of the meter.

   CAUTION: BE SURE THE TESTER IS OFF WHEN REMOVING OR REPLACING THE COVER FOR THE METER LAMPS TO PREVENT DAMAGE TO THE METER.

   Check the two #51 METER LAMPS for continuity and looseness in the sockets.

3. If the ROLL CHART LAMP does not light, disconnect the tester from the power source and remove the ten panel mounting screws. Carefully remove the tester from the case and place face down on a bench or other flat surface. The 120 volt, 7 watt ROLL CHART LAMP is located beneath the front panel. Check the lamp for continuity and looseness in the socket.

D. Bias Fuse

1. A type 49 lamp serves as the BIAS FUSE and overload indicator to protect the BIAS control R28 from accidental damage.

2. If the BIAS FUSE is burned out, no bias voltage will be present and the test circuits will be inoperative.

3. If no bias voltage is present check the lamp for continuity and looseness in the socket.

E. Tubes

1. Two full wave rectifier tubes are used in the tester. One type 83 tube, V1, is used in the mutual conductance test circuit to supply plate voltage. The 5Y3GT, V2 supplies dc screen and bias voltages for the tube under test.

2. Failure of both halves of the type 83 tube, V1, will cause loss of the plate supply voltage and the pointer of the METER will remain on zero when a tube is tested for

Mutual Conductance by pressing the RED push button, S5. Failure of only one half of the type 83 tube, V1, will cause a decrease in the plate supply voltage, and the pointer of the METER will move sharply off scale to the left or right when a tube is tested for Mutual Conductance.

3. Failure of the type 5Y3GT tube would result in lack of voltage in the screen and bias circuits of the tube under test. To check bias and screen voltages refer to paragraph G of this section.

4. To remove rectifier tubes V1 and V2 for test, or replacement:

   a. Disconnect the power cable.
   b. Remove the ten mounting screws around the edge of the panel.
   c. Carefully lift the entire unit out of its case, and turn face down on the test bench or other flat surface.
   d. Depress the tube base spring clamps and remove the tube from the socket.

F. Test Leads

1. Inspect all test leads for defective insulation and test for continuity. Make any minor repairs necessary, but if leads are in poor condition, or beyond repair, order replacements immediately.

G. Voltage and Calibration Check

The Model 752 may be checked for proper calibration and voltages by using the following procedure:

WARNING
HIGH VOLTAGE

Dangerous voltages are present within this equipment
Use caution when servicing or testing.

1. Switch and control settings: Set FILAMENT switch on OFF, VR VOLTAGE control fully counter-clockwise, SELECTORS on 7256-3481, BIAS control on zero, SHUNT control on 100, MULTIPLIER on X2, LEAKAGE switch on TUBE TEST. Turn tester ON and set LINE ADJUST for LINE TEST mark on the meter.

NOTE

All dc voltage readings with the exception of the bias cut-off voltage (D.C.) are to be made with a 1000 ohms/volt meter. The bias cut-off voltage reading is to be made with a dc vacuum tube voltmeter. All ac measurements, except for the signal voltages, are to be made with a 1000 ohms/volt ac voltmeter. The signal voltages are to be measured with an ac vacuum tube voltmeter. Suitable meter ranges should be used to give a reading near full scale.

2. Plate Voltages Check (150 VDC) (68 VDC)

   a. Connect the positive (+) lead of the dc voltmeter to Pin #3 of the OCTAL test socket and the negative (-) lead of the voltmeter to Pin #8 of the same socket. Press push button S5. The voltmeter should read 150 volts, ± 5 volts.

   b. With the voltmeter connected to the same OCTAL socket pins, press push button S4. The voltmeter meter should read 68 volts, ± 3 volts.

   c. These voltages are the NORMAL and LOW PLATE potentials used to make Mutual Conductance tests.

3. Screen Voltages Check (130 VDC) (56 VDC)

   a. Connect the positive (+) lead of the dc voltmeter to Pin #4 of the OCTAL test socket and the negative (-) lead of the voltmeter to Pin #8 of the same socket. Press push button S5. The voltmeter should read 130 volts, ± 5 volts.

   b. With the same voltmeter connections press push button S4. The voltmeter should read 56 volts, ± 3 volts.

   c. These checks are the NORMAL and LOW SCREEN potentials used to make Mutual Conductance tests on heptode and pentode type tubes.

4. Bias Voltage Check (39 VDC) (3 VDC) (30 VDC)

   a. Set BIAS control on 100. Connect the positive (+) lead of voltmeter to Pin #8 of the OCTAL socket and connect the negative (-) lead of the voltmeter to Pin #5 of the same socket. Press push button S5 and read 39 volts ± 1 volt on the dc voltmeter.

   b. With the same voltmeter connection turn the BIAS control to 22. Voltmeter should read 3.0 volts ± .2 volts.

NOTE

Use a DC Vacuum Tube Voltmeter for this check.

   c. Connect the positive (+) lead of the dc Vacuum Tube Voltmeter to pin #8 of the OCTAL socket and connect the negative (-) lead to Pin #5 of the same socket. Hold down push button S8 and press S5. Read over 30 volts. This is the bias cut-off voltage used for dual tests.

5. Signal Voltage Check (2.5 VAC, 1.25 VAC, 2.5 VAC, 1.25 VAC, 0.5 VAC, 0.25 VAC USE VACUUM TUBE VOLTMETER)

   a. Set Bias control on 0 and connect AC Vacuum Tube Voltmeter between Pins No. 5 and 8 on the OCTAL test socket. Set MULTIPLIER switch on SHUNT position. Press push button S5 and read 2.40 to 2.55 volts.

   b. With the same voltmeter connection set MULTIPLIER switch to the X1 position. Press S5 and read 1.23 to 1.30 volts.

   c. Set MULTIPLIER switch to the X2 position. Press S5 and read 2.40 to 2.55 volts.

   d. Set MULTIPLIER switch to X4 position. Press S5 and read 1.23 to 1.30 volts.

   e. Set MULTIPLIER switch to X10 position. Press S5 and read 0.48 to 0.52 volts.

   f. Set MULTIPLIER switch to X20 position. Press S5 and read .240 to .255 volts.

6. A.C. Plate Voltages (20 VAC, 35 VAC, 175 VAC, 290 VAC)

   a. Connect an ac voltmeter, 1,000 ohms per volt, between Pins #3 and 8 of OCTAL socket. Press push button S1 and read 18 to 20 volts. This voltage is used to test detector type diodes.

   b. With the same voltmeter connection press push button S3 and read 35 to 38 volts. This voltage is used to test power rectifiers.

c. With the same voltmeter connection press S6 and read 165 to 175 volts. This voltage is used as the plate potential during gas test.

d. With the same voltmeter connection press S2 and read 285 to 300 volts. This voltage is used to test cold cathode rectifiers.

7. Leakage Circuit Check

a. Set the LEAKAGE switch on position 5 and insert a 500,000 ohm resistor between the plate jack, P, and the grid jack G. Read 500K on meter. To determine tolerance read 0 to 1500 scale; 500K on the LEAKAGE scale equals 425 on the 0 to 1500 scale. Tolerance on the 0 to 1500 scale is 375 to 475 (± 2 divisions).

8. Voltage Regulator Circuit Check (150 VDC, 50 MA).

a. Set the LEAKAGE switch on TUBE TEST position and the MULTIPLIER switch on VR position. Turn the VR VOLTAGE control fully counter-clockwise. Connect the positive (+) lead of the DC voltmeter to Pin #3 of the OCTAL socket and connect the negative (-) lead to Pin #8 of the same socket.

b. Adjust the VR VOLTAGE control for 150 volts on the external voltmeter. The tester meter, M1, should read 150 volts ± 2%, plus tolerance of external meter.

c. Turn the VR VOLTAGE control fully counter-clockwise. Connect the positive (+) lead of a DC milliammeter to Pin #3 of the OCTAL socket and connect the negative (-) lead to Pin #8.

d. Hold down push button S9, VR MILS, and adjust the VR VOLTAGE control for 50 MA on the external milliammeter. The tester meter, M1, should read 50 MA ± 1 MA plus tolerance of external meter.

9. Filament Voltage Check (.6 to 117 VAC)

a. Set the FILAMENT switch to the desired voltage.

b. Connect the terminals of the ac voltmeter between Pins #2 and 7 of the OCTAL test socket.

c. The meter should indicate within the limits indicated in Table 4-1 for various nominal settings of the FILAMENT switch.

10. The BIAS and SHUNT controls should indicate zero when they are in full counter-clockwise positions. If they do not, loosen set screws and reset knobs on the shafts.

H. Suggestions for Locating Trouble

If proper voltages are not present in the tester the following suggestions are offered for locating and correcting the trouble.

1. If all voltages are found to be either high or low it is possible that the trouble is in the line test circuit. Check calibration of line test circuit (see paragraph I. of this chapter). An excessively high or low resistance adjustment of R5 would result in improper adjustment of the line voltage causing high or low test voltages at the points covered in paragraph G of this chapter.

2. Incorrect Plate Voltages

a. High plate voltage can only result from the application of incorrect voltage to

TABLE 4-1 FILAMENT VOLTAGE CHART

NOMINAL	MIN	MAX
.6	.5	.7
1.1	1.0	1.2
1.4	1.3	1.6
2.0	1.8	2.2
2.5	2.3	2.9
3.0	2.7	3.5
4.3	3.9	4.7
5.0	4.5	5.6
6.3	6.0	6.7
7.5	7.0	8.2
10.0	9.0	11.0
12.6	11.5	13.8
17.0	15.5	18.7
20	18.0	22.0
25	23.0	28.0
35	33.0	39.0
50	45.0	56.0
75	70.0	83.0
117	107.0	128.0

CHART 4-3 VOLTAGE AND RESISTANCE TEST

TUBE	SOCKET PINS (OR TRANSFORMER TAPS)								
	1	2	3	4	5	6	7	8	
V1, 83	185VDC	190VDC 15K	190VDC 200	185VDC					VOLTS OHMS
V2, 5Y3GT		90VDC 10K		160VAC 400		160VAC 400		90VDC 10K	VOLTS OHMS

All readings are referenced to CATHODE (Self-Bias jacks with the link closed), with the tubes in the sockets.

All DC voltage measurements are made with a 20,000 ohms/volt meter and all AC measurements are made with a 1000 ohms/volt meter, Hickok Model 456 or equivalent.

the primary of T1, see paragraph A1, above.

b. Low plate voltage will result from a defective 83 tube V1.

3. Probable causes of incorrect voltages in the tube tester are listed in Table 4-3.

4. Replacement of Resistor R27.

If it is necessary to replace this resistor, adjustment of the sliding contacts must be made to establish the proper bias and low screen voltages. Resistor R27 is located between the transformer, T1, and the base of the 83 tube, V1.

a. Set all controls in accordance with paragraph G-1 of this chapter. Be sure to make LINE TEST.

b. Connect the positive (+) lead of a DC voltmeter (1000 ohms/volt) to Pin #8 of the OCTAL socket and connect the negative (-) lead to Pin #5.

c. Set the BIAS control at 100.

d. Adjust the shorting slider of R27 until the meter reads 39 volts.

e. Connect the positive (+) lead of the voltmeter to Pin #4 of the OCTAL socket and the negative (-) lead to Pin #8. Press push button S4 and adjust the voltage tap slider until the meter reads 56 volts DC.

f. Tighten the slider screws and recheck the voltages. The proper bias and low screen voltage are now established.

I. Calibration of Line Test Circuit

1. Remove the test set from its case.

2. Set all controls in accordance with paragraph G-1 of this chapter.

3. Connect tester to 115 volt AC source and turn it on.

4. Connect the positive (+) lead of a DC voltmeter (1000 ohms/volt, on suitable range to make 150 volt measurement) to Pin #3 of the OCTAL socket and connect the negative (-) to Pin #8 of the same socket.

5. Hold down push button S5 and turn the LINE ADJUST control until the external voltmeter reads 150 volts.

6. Change the positive lead (+) of the voltmeter from Pin #3 to Pin #4. Press push button S5 and check for a reading of 128 to 134 volts DC. These two readings (150 volts and 130 volts) establish correct plate and screen voltages.

7. If the screen voltage check falls outside the 128 to 134 volt tolerance, reset the LINE ADJUST knob until the plate voltage (Pins #3 to #8) falls between 148 to 152 volts and the screen voltage (Pins #4 to #8) falls between 128 to 134 volts.

8. After the conditions stated in I-7 have been met, the adjustment of the calibration control, R5, can be made. (Control R5 is the screw driver adjusted control located nearest the outer edge of the tester and fastened to the phenolic board which is mounted on the transformer.) To make the adjustment, press the LINE ADJUST push button, S10, and adjust R5 until the pointer of the test meter, M1, indicates exactly to the line marked LINE TEST.

TABLE 4-2 VOLTAGE TROUBLE CHART

CONDITION	POSSIBLE CAUSE	REMEDY
Plate Voltage High	LINE ADJUST Calibration off	Calibrate
Plate Voltage Low	Defective 83 tube V1. Open winding T1 secondary R to T or U to V	Replace Replace T1
Plate Voltage Zero	Defective 83 tube V1 Open winding T1 secondary R to T, U to V, or 18 to 20	Replace Replace T1
NOTE: Conditions apply to	both NORMAL and LOW PLATE voltages	
NORMAL Screen Voltage High	BIAS control, R28, open at positive end Resistor R27 open LINE ADJUST calibration off	Replace Replace Calibrate
NORMAL Screen Voltage Low	5Y3GT tube V2 weak Open winding T1 secondary, M, N, O, or J, K, L.	Replace Replace T1
NORMAL Screen Voltage Zero	BIAS control R28 open at (-) end Defective 5Y3GT tube V2 Open windings T1 secondary M, N, O, or J, K, L.	Replace Replace Replace T1
LOW Screen Voltage High	LINE ADJUST calibration off Slider taps on R27 off	Calibrate Adjust
LOW Screen Voltage Low	5Y3GT Tube V2 weak Open winding T1 secondary, M, N,O, or J, K, L. Slider Taps on R27 off	Replace Replace T1 Adjust
LOW Screen Voltage Zero	Defective 5Y3GT tube V2 Resistor R27 or BIAS control R28 open	Replace Replace
Bias Voltage High	BIAS control, R28, open at negative end Shorting slider on resistor R27 off	Replace Adjust
Bias Voltage Low	Weak 5Y3GT tube V2 Shorting slider on resistor R27 off Open winding on T1 secondary J, K, L or M, N, O.	Replace Adjust Replace
Bias Voltage Zero	BIAS control R28 open at positive end Resistor R27 open Defective 5Y3GT tube V2 Open windings on T1 secondary J, K, L, or M, N, O.	Replace Replace Replace Replace T1
Cut-off Bias Voltage Low	Capacitor C3 open	Replace
Cut-off Bias Voltage Zero	1N91 diode CR2 defective	Replace
VR Voltage Checks Low	Capacitor C4 open	Replace
VR Voltage Zero	VR VOLTAGE control open Resistors R12 or R13 open	Replace Replace
Signal Voltage High	BIAS control R28 not set at zero Defective resistor R31, R32, R33, R34 or R35	Reset Replace
Signal Voltage Low	Defective resistor R31, R32, R33, R34 or R35	Replace
Signal Voltage Zero	Defective resistor R31, R32, R33, R34 or R35 Open winding T1 secondary P. Q.	Replace Replace T1

TUBE TYPE	FIL.	SELECTORS	BIAS	SHUNT	MULT	PRESS	MINIMUM MUT COND	NOTATIONS
OA2	OFF	0000–5020	—	—	VR	†S9	150V	
OA3/VR75	OFF	0000–5020	—	—	VR	†S9	75V	
OB2	OFF	0000–5020	—	—	VR	†S9	108V	
OB3/VR90	OFF	0000–5020	—	—	VR	†S9	90V	
OC2	OFF	0000–5020	—	—	VR	†S9	75V	
OC3/VR105	OFF	0000–5020	—	—	VR	†S9	105V	
OD3/VR150	OFF	0000–5020	—	—	VR	†S9	150V	
OE3/85A1	OFF	0000–2080	—	—	VR	†S9	85V	
OG3/85A2	OFF	0000–1020	—	—	VR	†S9	85V	
OZ4	OFF	0000–5380	0	85	SH	S2	650	
1A3	1.4	7100–2030	0	0	SH	S1	400	
1AD2‡	1.4	1000–0000	0	53	SH	S6	400	Cap–P
1AD4	1.1	3540–1200	14	—	X4	S4	225	
1AG4	1.1	3540–1200	25	—	X1	S5	525	
1AH4	1.1	6340–1200	12	—	X1	S5	475	
1AK4	1.1	6340–1200	12	—	X1	S5	375	
1AU2	1.1	4500–9000	0	81	SH	S6	400	
1AY2	1.1	2700–0000	0	90	SH	S6	400	CAP–P. CONNECT FIL PIN 5 TO OCTAL SOCKET PINS 7 & 7 WITH EXTERNAL LEADS
1B1	OFF	0000–1400	0	0	SH	—	—	SET LEAKAGE SWITCH TO POSITION 6. METER WILL DEFLECT FULL SCALE FOR A GOOD TUBE
1B3	1.1	7200–0000	0	80	SH	S6	400	Cap–P
†BC2	1.1	1500–0000	0	84	SH	S6	400	Cap–P
1BH2	1.1	3600–0000	0	84	SH	S6	400	CAP–P. CONNECT FIL LEADS TO OCTAL SOCKET PINS 3&8
1BK2	1.4	4200–0000	0	85	SH	S6	400	Cap–P
1BX2	1.4	1200–0000	0	80	SH	S6	400	Cap–P
1BY2‡	1.1	1000–0000	0	53	SH	S6	400	Cap–P
1DG3	1.1	8300–0000	0	57	SH	S6	400	Cap–P
1D-K29	1.1	1200–0000	0	—	X1	S3	400	TRIP–P. CONNECT FIL LEADS TO PINS 1 AND 3
1G3	1.1	7200–0000	0	80	SH	S6	400	Cap–P
1H2	1.4	1200–0000	0	78	SH	S6	400	Cap–P
1J3	1.1	7200–0000	0	53	SH	S6	400	Cap–P
1K3	1.1	7200–0000	0	53	SH	S6	400	Cap–P
1N2	1.1	7200–0000	0	80	SH	S6	400	Cap–P
1R5	*1.4	1740–3062	10	—	X2	S4	425	
1R-K23	1.4	4200–0000	0	85	SH	S6	400	Cap–P
1S2A	1.4	4200–0000	0	85	SH	S6	400	Cap–P
1S4	1.4	1730–2400	23	—	X2	S4	475	
1S5	1.4	1760–5400	13	—	X1	S5	400	Pent. Sect.
1S5	1.4	1700–3000	0	15	SH	S1	400	Diode Sect.
1U4	1.4	1760–2300	14	—	X2	S5	275	
1V2	0.6	4500–9000	0	65	SH	S6	650	
1W5	1.1	4520–7800	0	—	X1	S5	450	

TUBE TYPE	FIL.	SELECTORS	BIAS	SHUNT	MULT	PRESS	MINIMUM MUT COND	NOTATIONS
1X2	1.1	1200–0000	0	80	SH	S6	400	Cap–P
2-01C	5.0	2700–5000	0	68	SH	S1	250	USE NICKEL ADAPTER CODE NO. [illegible]
2AF4	2.5	4320–1050	16	—	X10	S4	400	
2AH2‡	2.5	1000–0000	0	79	SH	S6	400	Cap–P
2AS2‡	2.5	1000–0000	0	81	SH	S6	400	Cap–P
2AV2	2.0	4500–9000	0	65	SH	S6	650	
2AZ2	2.0	1200–0000	0	90	SH	S6	400	Cap–P
2BA2	2.0	4500–1000	0	88	SH	S6	650	
2BJ2	2.5	1200–0000	0	87	SH	S6	400	Cap–P
2BN4	2.0	4320–5010	16	—	X10	S5	425	
2BN4A	2.0	4320–5010	16	—	X10	S5	500	
2BU2‡	2.5	1000–0000	0	85	SH	S6	400	Cap–P
2C36	6.3	7260–5000	39	—	X4	S5	700	USE NICKEL ADAPTER CODE NO. [illegible]
2C39	6.3	7260–5030	24	—	X20	S5	625	USE NICKEL ADAPTER CODE NO. [illegible]
2C43	6.3	7200–0050	12	—	X10	S5	400	CAP–P RING–K
2C46	6.3	7200–0080	14	—	X4	S5	325	CAP–P RING–G
2C51	6.3	9173–6482	16	—	X10	S5	300	‡Dual Triode
2CN3A	2.0	2700–0000	0	87	SH	S6	400	Cap–P
2CW4‡	2.0	3140–2080	10	—	X10	S4	575	USE ADAPTER 54-3, [illegible]
Model 752A:								
2CW4	2.0	AC40–2080	10	—	X10	S4	575	
2CY5	2.5	4310–5620	12	—	X4	—	625	HOLD DOWN S1 AND PRESS S3.
2D21	6.3	4310–6025	#	93	SH	S6	650	STRIKES ABOUT 3#
2DF4	2.5	4580–3100	23	—	X4	S5	700	
2DS4‡	2.0	3140–2080	9	—	X10	S4	600	USE ADAPTER 54-3, [illegible]
Model 752A:								
2DS4	2.0	AC40–2080	9	—	X10	S4	600	
2DV4‡	2.0	AC60–1070	13	—	X10	S4	700	
2DX4	2.5	3420–1050	26	—	X10	S5	500	
2EA5	2.5	4310–5620	12	—	X10	S5	375	
2EG4‡	2.0	3140–2080	18	—	X4	S5	625	SET "LINE ADJUST" AT 115 ON 150 SCALE USE ADAPTER 54-3, [illegible]
Model 752A:								
2EG4	2.0	AC40–2080	18	—	X4	S5	625	SET "LINE ADJUST" AT 115 ON 150 SCALE
2EN5	2.0	4300–7256	0	78	SH	S1	400	‡Dual Diode
2ER5	2.0	4320–5670	11	—	X10	S5	650	
2ES5	2.5	3420–5010	10	—	X10	S5	550	
2EV5	2.5	3410–5620	10	—	X10	S5	550	
2FH5	2.5	3420–5070	12	—	X10	S5	550	
2FQ5	2.5	4320–5076	14	—	X10	S5	650	
2FQ5A	2.5	4320–5070	14	—	X10	S5	750	
2FS5	2.5	4310–5670	10	—	X10	S5	500	
2FV6	2.5	4310–5672	14	—	X10	S5	375	
2GK5	2.5	3420–5076	14	—	X10	S5	750	
2GU5	2.5	4310–5620	9	—	X20	S5	650	
2GW5	2.5	4320–1050	19	—	X10	S5	300	
2HA5	2.0	4310–5076	17	—	X10	S5	475	
2HK5	2.5	4310–5020	17	—	X10	S5	575	
2HM5	2.5	4310–5076	17	—	X10	S5	475	
2HQ5	2.5	4310–5076	14	—	X20	S5	450	

TUBE TYPE	FIL	SELECTORS	BIAS	SHUNT	MULT	PRESS	MINIMUM MUT COND	NOTATIONS
4BU8	4.3	4570-8219	0	—	X2	—	175	PENTODE NO. 1 HOLD DOWN S1 AND PRESS S5.
4BU8	4.3	4570-3216	0	—	X2	—	175	PENTODE NO. 2 HOLD DOWN S1 AND PRESS S6.
4BZ6	4.3	4310-5627	10	—	X4	S5	700	
4BZ7	4.3	4572-6183	17	—	X10	S6	425	‡Dual Triode
4CB6	4.3	4310-5627	10	—	X4	S5	700	
4CS6	4.3	4310-5627	16	—	X1	S5	300	Grid No. 1
4CS6	4.3	4370-5621	0	—	X1	S5	775	Grid No. 3
4CX250B	6.3	3750-0120	Test for Shorts Only.					ARMORE COOLER-P. USE AMPHENOL ADAPTER CODE NO. 1200-100. HOLD DOWN S1 AND PRESS S2
4CY5	4.3	4310-5620	12	—	X4	—	625	
4DE6	4.3	4310-5627	10	—	X4	S5	700	
4DK8	4.3	4310-5627	10	—	X10	S5	400	
4DT6	4.3	4310-5627	12	—	X1	S5	375	Grid No. 1
4DT6	4.3	4370-5621	8	—	X1	S5	300	Grid No. 3
4EH7	4.3	4520-7819	17	—	X4	S6	650	
4EJ7	4.3	4520-7819	10	—	X10	S5	500	
4ES8	4.3	4572-6183	22	—	X10	S5	475	‡Dual Triode
4EW6	4.3	4310-5627	11	—	X4	S5	775	
4GK5	4.3	4320-5076	14	—	X10	S5	750	
4GM6	4.3	4310-5627	10	—	X10	S5	575	
4GS8	4.3	4570-8219	0	—	X1	—	350	PENT. NO. 1, HOLD DOWN S1 AND PRESS S4
4GS8	4.3	4570-3216	0	—	X1	—	350	PENT. NO. 2, HOLD DOWN S1 AND PRESS S5
4GX7	4.3	4520-6710	11	—	X10	S5	450	Pent. Sect.
4GX7	4.3	4590-8010	15	—	X10	S5	600	Triode Sect.
4GZ5	4.3	4320-7610	21	—	X4	S5	750	
4HA5	4.3	4310-5076	17	—	X10	S5	475	
4HA7‡	4.3	1C90-A040	22	—	X4	S5	475	Triode No. 1
4HA7	4.3	1C80-2030	14	—	X4	S5	200	Triode No. 2
4HC7‡	4.3	1C90-A040	14	—	X10	S5	300	Triode No. 1
4HC7	4.3	1C80-2030	12	—	X1	S5	550	Triode No. 2
4HK5	4.3	4310-5020	17	—	X10	S5	575	
4HM5	4.3	4310-5076	17	—	X10	S5	475	
4HM6	4.3	4520-7819	10	—	X10	S5	625	
4HQ5	4.3	4310-5076	14	—	X20	S5	450	
4HS8	4.3	4570-8219	10	—	X1	S5	325	Pent. No. 1
4HS8	4.3	4570-3216	10	—	X1	S5	325	Pent. No. 2
4HT6	4.3	4520-7819	10	—	X10	S5	475	
4JC6	4.3	4520-7819	11	—	X10	S5	700	
4JD6	4.3	4520-7839	10	—	X10	—	450	HOLD DOWN S1 AND PRESS S2.
4JH6	4.3	4310-5627	12	—	X10	S5	375	
4JK6	4.3	3410-5627	14	—	X20	S5	625	
4JL6	4.3	3410-5627	20	—	X10	S5	500	
4KE8	4.3	4520-6370	9	—	X10	S5	550	Pent. Sect.
4KE8	4.3	4590-1080	17	—	X10	S5	475	Triode Sect.
4KF8	4.3	4570-8219	10	—	X2	S5	225	Pent. No. 1
4KF8	4.3	4570-3216	10	—	X2	S5	225	Pent. No. 2
4KT6	4.3	4520-7819	9	—	X10	S5	750	
4LJ8	4.3	4590-6780	10	—	X10	S5	625	Pent. Sect.
4LJ8	4.3	4510-2030	10	—	X10	S5	500	Triode Sect.
4LU6	4.3	4310-5627	10	—	X10	S5	375	

TUBE TYPE	FIL	SELECTORS	BIAS	SHUNT	MULT	PRESS	MINIMUM MUT COND	NOTATIONS
4MK8	4.3	4570-8219	0	—	X2	—	175	PENT. NO. 1, HOLD DOWN S1 AND PRESS S5
4MK8	4.3	4570-3216	0	—	X2	—	175	PENT. NO. 2, HOLD DOWN S1 AND PRESS S6
4X150A	6.3	3750-0120	Test for Shorts Only.					ARMORE COOLER-P. USE AMPHENOL ADAPTER CODE NO. 200-100. ARMORE COOLER-P. USE AMPHENOL ADAPTER CODE NO. 1200-100.
4X250B	6.3	3750-0120	Test for Shorts Only.					
5AM8	5.0	4520-6319	10	—	X4	S5	550	Pent. Sect.
5AM8	5.0	4500-8070	0	78	SH	S1	400	Diode Sect.
5AN8	5.0	4580-6791	10	—	X4	S5	700	Pent. Sect.
5AN8	5.0	4520-1736	24	—	X4	S5	500	Triode Sect.
5AQ5	5.0	4310-5620	18	—	X4	S5	575	
5AR4	5.0	8200-6400	0	68	SH	S3	650	‡Dual Diode
5AS8	5.0	4520-9137	10	—	X4	S5	700	Pent. Sect.
5AS8	5.0	4500-6087	0	78	SH	S1	400	Diode Sect.
5AT8	5.0	4590-6738	10	—	X4	S5	725	Pent. Sect.
5AT8	5.0	4510-2038	15	—	X10	S5	350	Triode Sect.
5AU4	7.5	8200-6000	0	51	SH	S3	650	Plate No. 1
5AU4	7.5	8200-4000	0	45	SH	S3	650	Plate No. 2
5AV8	5.0	4560-9870	10	—	X4	S5	700	Pent. Sect.
5AV8	5.0	4520-3010	24	—	X4	S5	500	Triode Sect.
5B8	5.0	4560-9871	15	—	X4	S5	700	Pent. Sect.
5B8	5.0	4520-3019	24	—	X4	S5	500	Triode Sect.
5BC3‡	5.0	1300-9000	0	40	SH	S3	650	PLATE NO. 1 USE ADAPTER SK-4, ITEM-144
5BC3	5.0	1300-5000	0	35	SH	S3	650	PLATE NO. 2
Model 752A: No Adapter Required.								
5BE8	5.0	4590-6783	12	—	X4	S5	475	Pent. Sect.
5BE8	5.0	4510-2030	10	—	X10	S5	525	Triode Sect.
5BK7A	5.0	4572-6183	10	—	X10	S5	525	‡Dual Triode
5BQ7A	5.0	4572-6183	15	—	X10	S5	400	‡Dual Triode
5BR8	5.0	4590-6780	12	—	X4	S5	475	Pent. Sect.
5BR8	5.0	4510-2030	10	—	X10	S5	525	Triode Sect.
5BT8	5.0	4580-6790	10	—	X4	S5	700	Pent. Sect.
5BT8	5.0	4500-1230	0	68	SH	S1	400	‡Dual Diode
5BW8	5.0	4560-9870	12	—	X4	S5	475	Pent. Sect.
5BW8	5.0	4500-3120	0	78	SH	S1	400	‡Dual Diode
5CG8	5.0	4590-6780	10	—	X4	S5	725	Pent. Sect.
5CG8	5.0	4510-2030	15	—	X10	S5	350	Triode Sect.
5CL8	5.0	4590-6780	10	—	X4	S5	550	Tetrode Sect.
5CL8	5.0	4510-2030	12	—	X10	S5	425	Triode Sect.
5CM8	5.0	4520-6730	10	—	X4	S5	700	Pent. Sect.
5CM8	5.0	4590-1080	12	—	X2	S5	475	Triode Sect.
5CQ8	5.0	4520-6370	10	—	X4	S5	525	Tetrode Sect.
5CQ8	5.0	4590-1080	11	—	X10	S5	425	Triode Sect.
5CZ5	5.0	4530-9170	10	—	X4	S5	700	
5DH8	5.0	4590-6783	10	—	X4	S5	775	Pent. Sect.
5DH8	5.0	4510-2030	14	—	X4	S5	550	Triode Sect.
5DJ4	5.0	8200-6000	0	35	SH	S3	650	Plate No. 1
5DJ4	5.0	8200-4000	0	30	SH	S3	650	Plate No. 2
5EA8	5.0	4520-6370	9	—	X4	S5	550	Pent. Sect.
5EA8	5.0	4590-1080	10	—	X10	S5	525	Triode Sect.
6ES8	5.0	4572-6183	22	—	X10	S5	475	‡Dual Triode

TUBE TYPE	FIL	SELECTORS	BIAS	SHUNT	MULT	PRESS	MINIMUM MUT COND	NOTATIONS
5EU8	5.0	4570–1980	9	—	X4	S5	550	Pent. Sect.
5EU8	5.0	4520–3060	10	—	X10	S5	525	Triode Sect.
5EW6	5.0	4310–5627	11	—	X4	S5	775	
5FG7	5.0	4590–6780	10	—	X4	S5	575	Pent. Sect.
5FG7	5.0	4510–2030	14	—	X10	S5	475	Triode Sect.
5FV8	5.0	4590–6780	10	—	X4	S5	550	Pent. Sect.
6FV8	5.0	4510–2030	15	—	X10	S5	450	Triode Sect.
5GH8	5.0	4520–6370	11	—	X4	S5	625	Pent. Sect.
5GH8	5.0	4590–1080	13	—	X10	S5	525	Triode Sect.
5GM6	5.0	4310–5627	10	—	X10	S5	575	
5GS7	5.0	4590–6780	10	—	X10	S5	500	Pent. Sect.
5GS7	5.0	4510–2030	33	—	X10	S5	300	Triode Sect.
5GX6	5.0	3410–5627	13	—	X2	S5	575	
5GX7	5.0	4520–6710	11	—	X10	S5	450	Pent. Sect.
5GX7	5.0	4590–8010	15	—	X10	S5	600	Triode Sect.
5HA7‡	5.0	1C90–A040	22	—	X4	S5	475	
5HA7	5.0	1CB0–2030	14	—	X4	S5	200	
5HB7	5.0	4520–6710	12	—	X4	S5	675	Pent. Sect.
5HB7	5.0	4590–8010	12	—	X20	S5	300	Triode Sect.
5HC7‡	5.0	1C90–A040	14	—	X10	S5	300	Triode No. 1
5HC7	5.0	1CB0–2030	12	—	X1	S5	550	Triode No. 2
5HG8	5.0	4520–8930	11	—	X10	S5	475	Pent. Sect.
5HG8	5.0	4560–7030	33	—	X10	S5	350	Triode Sect.
5HZ6	5.0	3410–5627	10	—	X2	S5	450	
5J6	5.0	4356–2170	17	—	X10	S5	325	‡Dual Triode
5JK6	5.0	3410–5627	14	—	X20	S5	625	
5JL6	5.0	3410–5627	20	—	X10	S5	500	
5KD8	5.0	4520–6370	6	—	X4	S5	700	Pent. Sect.
5KD8	5.0	4590–1080	17	—	X10	S5	500	Triode Sect.
5KE8	5.0	4620–6370	9	—	X10	S5	550	Pent. Sect.
5KE8	5.0	4590–1080	17	—	X10	S5	475	Triode Sect.
5KZ8	5.0	4520–6730	14	—	X4	S5	625	Pent. Sect.
5KZ8	5.0	4590–1080	18	—	X10	S5	400	Triode Sect.
5LJ8	5.0	4590–6780	10	—	X10	S5	625	Pent. Sect.
5LJ8	5.0	4510–2030	10	—	X10	S5	500	Triode Sect.
5MB8	5.0	4590–6780	8	—	X10	S5	550	Pent. Sect.
5MB8	5.0	4510–2030	12	—	X10	S5	525	Triode Sect.
5MQ8	5.0	4520–6370	10	—	X10	S5	450	Pent. Sect.
5MQ8	5.0	4590–1080	10	—	X10	S5	600	Triode Sect.
5R4	5.0	8200–6000	0	20	SH	S3	650	Plate No. 1
5R4	5.0	8200–4000	0	15	SH	S3	650	Plate No. 2
5T8	5.0	4580–9076	15	—	X4	S5	175	Triode Sect.
5T8	5.0	4500–6273	0	78	SH	S1	400	‡Dual Diode
5T8	5.0	4500–1078	0	78	SH	S1	400	Diode No. 3
6U4	5.0	8200–6000	0	35	SH	S3	650	Plate No. 1
6U4	5.0	8200–4000	0	30	SH	S3	650	Plate No. 2
5U8	5.0	4520–6370	12	—	X4	S5	475	Pent. Sect.
5U8	5.0	4590–1080	10	—	X10	S5	525	Triode Sect.
5U9‡	6.3	5630–7824	14	—	X10	S5	375	PENT. SECT. USE ADAPTER SA-11, 1956-177.
5U9‡	6.3	56A0–9010	30	—	X10	S5	300	Triode Sect.
5V3	6.3	8200–6000	0	45	SH	S3	650	Plate No. 1
5V3	6.3	8200–4000	0	38	SH	S3	650	Plate No. 2
5V4	5.0	8200–6400	0	60	SH	S3	650	‡Dual Diode
5V6	5.0	7250–3480	1B	—	X4	S5	575	
5V9‡	5.0	5630–7412	15	—	X1	—	700	KEPT. SECT. HOLD GRWN S1 AND PRESS S5. USE ADAPTER SA-11, 1956-177.
5V9	5.0	5660–A090	23	—	X4	S5	650	Triode Sect.
5X8	5.0	4570–9861	10	—	X4	S5	725	Pent. Sect.
5X8	5.0	4520–3061	15	—	X10	S5	350	Triode Sect.
5X9‡	6.3	5630–7824	15	—	X10	S5	375	PENT. SECT. USE ADAPTER SA-11, 1956-177.
5X9	6.3	56A0–9010	14	—	X4	S5	750	Triode Sect.
5Y3	5.0	8200–6000	0	36	SH	S3	400	Plate No. 1
5Y3	5.0	8200–4000	0	27	SH	S3	400	Plate No. 2
6AB4	6.3	4360–1070	14	—	X4	S5	625	
6AB9‡	6.3	5690–78A0	16	—	X10	S5	375	TETRODE NO. 1. USE ADAPTER SA-11, 1956-171.
6AB9	6.3	5630–1240	16	—	X10	S5	375	Tetrode No. 2
6AC7	6.3	7240–8653	13	—	X10	S5	375	
6AC9‡	6.3	1C90–BA87	11	—	X10	S5	450	Pent. Sect.
6AC9	6.3	1C00–3040	0	87	SH	S1	400	Diode No. 1
6AC9	6.3	1C00–2030	0	87	SH	S1	400	Diode No. 2
6AC10‡	6.3	1C90–A040	11	—	X10	S5	450	Triode No. 1
6AC10	6.3	1C7B–5263	11	—	X10	S5	450	‡Dual Triode
6AD10‡	6.3	1C30–7625	17	—	X2	S5	550	Pent. No. 1
6AD10	6.3	1C90–BA90	10	—	X10	S5	450	Pent. No. 2
6AF3	6.3	4500–2000	0	50	SH	S3	650	CONNECT CAP TO G3. SELF BIAS RES. 1K/6K3 MODEL 3624-CAP-K
Model 752A:								
6AF4	6.3	4320–1050	16	—	X10	S4	400	
6AF9‡	6.3	5680–A970	16	—	X10	S5	650	PENT. NO. 1. USE ADAPTER SA-11, 1956-177.
6AF9	6.3	5610–4320	12	—	X10	S5	450	Pent. No. 2
6AF11‡	6.3	1C80–2A90	12	—	X10	S5	450	Pent. Sect.
6AF11	6.3	1C60–8050	14	—	X4	S5	700	Triode No. 1
6AF11	6.3	1C30–4070	11	—	X4	S5	500	Triode No. 2
6AG5	6.3	4310–5620	10	—	X4	S5	625	
6AG7	6.3	7240–8651	12	—	X10	S5	475	
6AG9‡	6.3	1CB0–2A94	14	—	X10	S5	625	Pent. Sect.
6AG9	6.3	1C50–7060	19	—	X4	S5	725	Triode Sect.
6AG11‡	6.3	1C85–7694	12	—	X10	S5	525	‡Dual Triode
6AG11	6.3	1C00–A3B2	0	80	SH	S1	400	‡Dual Diode
6AH9‡	6.3	1C50–B879	15	—	X10	S5	750	Pent. Sect.
6AH9	6.3	1C20–3040	29	—	X4	S5	625	Triode Sect.
6AK5	6.3	4310–5620	10	—	X4	S5	675	
6AK6	6.3	4310–5672	17	—	X2	S5	725	
6AK9‡	6.3	1CB0–5970	35	—	X4	S5	850	Pent. Sect.
6AK9	6.3	1CA0–B070	17	—	X4	S5	575	Triode No. 1
6AK9	6.3	1C30–2070	30	—	X2	S5	625	Triode No. 2
6AK10‡	6.3	1C90–A040	17	—	X4	S5	725	Triode No. 1
6AK10	6.3	1C70–5060	17	—	X4	S5	725	Triode No. 2
6AK10	6.3	1CB0–2030	17	—	X4	S5	725	Triode No. 3
6AL3	6.3	4500–9020	0	56	SH	S3	800	CONNECT CAP TO PIN 2 OF OCTAL SOCKET
6AL5	6.3	4300–7215	0	78	SH	S1	400	‡Dual Diode

TUBE TYPE	FIL	SELECTORS	BIAS	SHUNT	MULT	PRESS	MINIMUM MUT COND	NOTATIONS
6AL9‡	6.3	1C80-2A94	5	—	X10	S5	690	Pent. Sect.
6AL9	6.3	1C50-7060	14	—	X10	S5	395	Triode Sect.
6AL11‡	6.3	1C80-BA90	19	—	X10	S5	400	Pent. No. 1
6AL11	6.3	1C30-6724	22	—	X2	S5	300	Pent. No. 2
6AM5	6.3	3410-5720	26	—	X4	S5	400	
6AM8	6.3	4520-6319	10	—	X4	S5	550	Pent. Sect.
6AM8	6.3	4500-8070	0	78	SH	S1	400	Diode Sect.
6AN4	6.3	4320-1050	13	—	X10	S5	475	
6AN5	6.3	4310-5670	7	—	X10	—	425	HOLD DOWN 11 AND FREEZE 33
6AN8	6.3	4580-6791	10	—	X4	S5	700	Pent. Sect.
6AN8	6.3	4520-1736	24	—	X4	S5	525	Triode Sect.
6AQ5	6.3	4310-5620	18	—	X4	S5	575	
6AR11‡	6.3	1CA0-8987	5	—	X10	S5	550	Pent. No. 1
6AR11	6.3	1C60-2364	5	—	X10	S5	550	Pent. No. 2
6AS6	6.3	4310-5627	0	—	X2	S5	550	
6AS7	7.5	7841-5263	55	—	X4	S4	625	‡Dual Triode
6AS8	6.3	4520-9137	10	—	X4	S5	700	Pent. Sect.
6AS8	6.3	4500-5087	0	78	SH	S1	400	Diode Sect.
6AS11‡	6.3	1C80-2A90	15	—	X10	S5	325	Pent. Sect.
6AS11	6.3	1C60-8050	11	—	X10	S5	500	Triode No. 1
6AS11	6.3	1C30-4070	15	—	X4	S5	600	Triode No. 2
6AT6	6.3	4310-7020	15	—	X4	S5	175	Triode Sect.
6AT6	6.3	4300-6520	0	30	SH	S1	400	‡Dual Diode
6AT8	6.3	4590-6736	10	—	X4	S5	725	Pent. Sect.
6AT8	6.3	4510-2038	15	—	X10	S5	350	Triode Sect.
6AU4	6.3	7800-5030	0	58	SH	S3	650	
6AU5	6.3	7210-5830	18	—	X10	S4	350	
6AU6	6.3	4310-5672	10	—	X4	S5	475	
6AU8	6.3	4570-9860	10	—	X10	S5	375	Pent. Sect.
6AU8	6.3	4520-3010	13	—	X10	S5	300	Triode Sect.
6AV6	6.3	4310-7026	14	—	X4	S5	200	Triode Sect.
6AV6	6.3	4300-6527	0	30	SH	S1	400	‡Dual Diode
6AV11‡	6.3	1C97-A546	23	—	X2	S5	750	‡TRIODES NO. 1 & NO. 2
6AV11	6.3	1C80-2030	23	—	X2	S5	750	Triode No. 3
6AW8	6.3	4570-9863	14	—	X10	S5	475	Pent. Sect.
6AW8	6.3	4520-3019	13	—	X10	S5	250	Triode Sect.
6AX3‡	6.3	1C00-4070	0	40	SH	S3	650	
6AX4	6.3	7800-5030	0	40	SH	S3	650	
6AX5	6.3	7200-5380	0	40	SH	S3	400	‡Dual Diode
6AY3‡	6.3	4500-2090	0	52	SH	S3	650	USE ADAPTER 54-4, 1000-144
Model 752A:		No Adapter Required.						
6AY11‡	6.3	1C85-7694	13	—	X1	S5	650	‡Triode Sect.
6AY11	6.3	1C00-A382	0	78	SH	S1	400	‡Diode Sect.
6AZ8	6.3	4560-1230	10	—	X4	S5	625	Pent. Sect.
6AZ8	6.3	4590-8070	24	—	X4	S5	500	Triode Sect.
6B10‡	6.3	1C53-6472	23	—	X4	S5	475	‡Dual Triode
6B10	6.3	1C00-A890	0	73	SH	S1	400	‡Dual Diode
6BA3‡	6.3	4500-2090	0	57	SH	S3	650	USE ADAPTER 54-4, 1000-144
Model 752A:		No Adapter Required.						
6BA5	6.3	3610-5780	18	—	X4	S5	325	
6BA6	6.3	4310-5672	0	—	X4	S5	500	
6BA7	6.3	4570-9132	0	—	X2	—	225	AMPL. SECT. HOLD DOWN 51 AND FREEZE 56
6BA7	6.3	4520-1037	16	—	X10	S5	500	Osc. Sect.
6BA8	6.3	4570-9860	10	—	X10	S5	375	Pent. Sect.
6BA8	6.3	4520-3010	29	—	X4	S5	425	Triode Sect.
6BA11‡	6.3	1C40-6387	10	—	X1	S5	325	Pent. No. 1
6BA11	6.3	1C40-2385	10	—	X1	S5	325	Pent. No. 2
6BA11	6.3	1C90-B0A0	30	—	X2	S5	550	Triode Sect.
6BC4	6.3	4520-1060	14	—	X20	S5	300	
6BC5	6.3	4310-5620	11	—	X4	S5	675	
6BC7	6.3	4500-8697	0	82	SH	S1	400	‡Dual Diode
6BC7	6.3	4500-2010	0	82	SH	S1	400	Diode No. 3
6BC8	6.3	4572-6183	18	—	X10	S5	375	‡Dual Triode
6BD4	6.3	7200-5010	0	25	SH	S1	400	Cap-P
6BD11‡	6.3	1C80-2A90	15	—	X10	S5	450	Pent. Sect.
6BD11	6.3	1C60-B050	14	—	X4	S5	800	Triode No. 1
6BD11	6.3	1C30-4070	14	—	X4	S5	700	Triode No. 2
6BE3‡	6.3	1C00-A070	0	58	SH	S3	650	
6BE6	6.3	4370-5621	0	—	X2	—	250	AMPL SECT. HOLD DOWN 51 AND FREEZE 56
6BE6	6.3	4310-6027	20	—	X10	S5	400	Osc. Sect.
6BF11‡	6.3	1C80-BA90	30	—	X10	S5	375	Pent. No. 1
6BF11	6.3	1C30-7625	17	—	X2	S5	200	Pent. No. 2
6BH3‡	6.3	4500-2090	0	52	SH	S3	650	USE ADAPTER 54-4, 1000-144
Model 752A:		No Adapter Required.						
6BH6	6.3	4310-5627	10	—	X4	S5	425	
6BH8	6.3	4570-9860	8	—	X10	S5	375	Pent. Sect.
6BH8	6.3	4520-3010	26	—	X4	S5	500	Triode Sect.
6BH11‡	6.3	1C80-A980	10	—	X10	S5	350	Pent. Sect.
6BH11	6.3	1C64-7352	15	—	X10	S5	550	‡Dual Triode
6BJ3‡	6.3	1C00-A070	0	60	SH	S3	650	
6BJ7	6.3	4500-8697	0	80	SH	S1	400	‡Dual Diode
6BJ7	6.3	4500-2013	0	80	SH	S1	400	Diode No. 3
6BJ8	6.3	4580-7090	26	—	X4	S5	425	Triode Sect.
6BJ8	6.3	4500-6132	0	78	SH	S1	400	‡Dual Diode
6BK4	6.3	7200-5010	0	65	SH	S1	500	Cap-G
6BK7	6.3	4572-6183	10	—	X10	S5	525	‡Dual Triode
6BK11‡	6.3	1C90-A040	21	—	X2	S5	250	Triode No. 1
6BK11	6.3	1C7B-5263	20	—	X2	S5	200	‡Dual Triode
6BL7	6.3	7841-5263	23	—	X10	S5	425	‡Dual Triode
6BL8	6.3	4520-6371	12	—	X4	S5	625	Pent. Sect.
6BL8	6.3	4590-1086	26	—	X4	S5	675	Triode Sect.
6BM8	6.3	4530-6720	26	—	X4	S5	625	Pent. Sect.
6BM8	6.3	4510-9080	0	—	X2	S5	775	Triode Sect.
6BN4	6.3	4320-5010	16	—	X10	S5	425	
6BN4A	6.3	4320-5010	16	—	X10	S5	500	
6BN6	6.3	4320-7516	0	—	X1	S5	500	Limiter Grid
6BN6	6.3	4360-7512	0	—	X1	S5	525	GRADUATING END
6BN8	6.3	4580-7090	15	—	X4	S5	400	Triode Sect.
6BN8	6.3	4500-6132	0	78	SH	S1	400	‡Dual Diode
6BN11‡	6.3	1C70-B98A	10	—	X10	S5	475	Pent. No. 1
6BN11	6.3	1C30-5426	10	—	X10	S5	475	Pent. No. 2
6BQ5	6.3	4520-7930	14	—	X10	S5	475	

TUBE TYPE	FIL.	SELECTORS	BIAS	SHUNT	MULT	PRESS	MINIMUM MUT COND	NOTATIONS
6BQ6	6.3	7250-0480	28	....	X10	S4	350	Cap=P
6BQ7A	6.3	4572-6183	16	....	X10	S5	400	‡Dual Triode
{6BR8	6.3	4590-6780	12	....	X4	S5	475	Pent. Sect.
{6BR8	6.3	4510-2030	10	....	X10	S5	525	Triode Sect.
{6BS3‡	6.3	4500-2090	0	60	SH	S3	400	USE ADAPTER SA-4, 1958-141
{Model 752A:		No Adapter Required.						
{6BU8	6.3	4570-8219	0	....	X2	....	175	PENT. NO. 1, HOLD DOWN S1 AND PRESS S5
{6BU8	6.3	4570-3216	0	....	X2	....	175	PENT. NO. 2, HOLD DOWN S1 AND PRESS S5
{6BV11‡	6.3	1C70-A988	13	....	X4	S5	400	Pent. No.1
{6BV11	6.3	1C60-3452	13	....	X4	S5	400	Pent. No.2
6BW3‡	6.3	1C00-4070	0	49	SH	S3	650	
{6BW8	6.3	4560-9870	12	....	X4	S5	475	Pent. Sect.
{6BW8	6.3	4500-3120	0	78	SH	S1	400	‡Dual Diode
{6BW11‡	6.3	1C80-89A7	13	....	X10	S5	475	Pent. No. 1
{6BW11	6.3	1C30-5426	10	....	X10	S5	600	Pent. No. 2
{6BY6	6.3	4310-5627	12	....	X2	S5	375	Grid No. 1
{6BY6	6.3	4370-5621	16	....	X2	....	150	GRID NO. 3 HOLD DOWN S1 AND PRESS S5
{6BY8	6.3	4510-7892	10	....	X4	S5	475	Pent. Sect.
{6BY8	6.3	4500-6030	0	78	SH	S1	400	Diode Sect.
{6BY11‡	6.3	1C80-8A90	45	....	X4	S5	630	Pent. No. 1
{6BY11	6.3	1C30-7625	15	....	X2	S5	350	Pent. No. 2
6BZ3‡	6.3	1C00-A070	0	77	SH	S3	400	
6BZ6	6.3	4310-5627	10	....	X4	S5	700	
6BZ7	6.3	4572-6183	17	....	X10	S5	425	‡Dual Triode
6C4	6.3	4360-1070	25	....	X2	S5	675	
{6C9‡	6.3	4570-9860	16	....	X4	S5	700	Tetrode No. 1
{6C9	6.3	4510-32A0	16	....	X4	S5	700	Tetrode No. 2
{6C10‡	6.3	1C97-A546	14	....	X4	S5	200	‡Dual Triode
{6C10	6.3	1CB0-2030	14	....	X4	S5	200	Triode No. 3
6CA4	6.3	4500-7130	0	42	SH	S3	660	‡Dual Diode
6CA5	6.3	3420-7610	0	....	X10	S5	425	
6CA7	6.3	7250-3481	23	....	X10	S5	375	
{6CA11‡	6.3	1C80-BA97	22	....	X4	S5	750	Pent. Sect.
{6CA11	6.3	1C60-4050	14	....	X4	S5	750	Triode No. 1
{6CA11	6.3	1C30-2070	14	....	X4	S5	700	Triode No. 2
6CB5	7.5	7240-0130	40	....	X10	S5	425	Cap=P
6CB6	6.3	4310-5627	10	....	X4	S5	700	
6CD3‡	6.3	1C00-A070	0	63	SH	S3	650	
6CD6	6.3	7250-0830	29	....	X10	S4	375	Cap=P
6CE3‡	6.3	1C00-4070	0	65	SH	S3	650	
6CE5	6.3	4310-5620	10	....	X4	S5	700	
6CG3‡	6.3	1C00-4070	0	78	SH	S3	400	
6CG7	6.3	4572-6183	23	....	X4	S5	400	‡Dual Triode
{6CG8	6.3	4590-6780	10	....	X4	S5	725	Pent. Sect.
{6CG8	6.3	4510-2030	15	....	X10	S5	350	Triode Sect.
{6CH3‡	6.3	4500-2090	0	66	SH	S3	650	USE ADAPTER SA-4, 1958-141
{Model 752A:		No Adapter Required.						
{6CJ3‡	6.3	4500-2090	0	78	SH	S3	400	USE ADAPTER SA-4, 1958-141
{Model 752A:		No Adapter Required.						
{6CK3‡	6.3	4500-2090	0	83	SH	S1	650	USE ADAPTER SA-4, 1958-141
{Model 752A:		No Adapter Required.						
6CK4	6.3	7210-5080	46	....	X4	S5	850	
{6CL3‡	6.3	4500-2090	0	83	SH	S1	650	USE ADAPTER SA-4, 1958-141
{Model 752A:		No Adapter Required.						
6CL5	6.3	7240-0130	46	....	X4	S5	725	Cap=P
6CL6	6.3	4520-6317	12	....	X10	S5	475	
{6CL8	6.3	4590-6780	10	....	X4	S5	550	Tetrode Sect.
{6CL8	6.3	4510-2030	12	....	X10	S5	425	Triode Sect.
{6CM3‡	6.3	4500-2790	0	64	SH	S3	650	CHART DR 4, USE ADAPTER SA-4, 1958-141
{Model 752A:		No Adapter Required.						
6CM6	6.3	4530-9170	18	....	X4	S5	575	
{6CM7	6.3	4570-6030	27	....	X4	S5	300	Triode No. 1
{6CM7	6.3	4560-1090	23	....	X10	S5	275	Triode No. 2
{6CN7	6.3	4570-B060	15	....	X4	S5	175	Triode Sect.
{6CN7	6.3	4500-2130	0	78	SH	S1	400	‡Dual Diode
6CQ4	6.3	B700-5030	0	49	SH	S3	650	
{6CQ8	6.3	4520-6370	10	....	X4	S5	525	Tetrode Sect.
{6CQ8	6.3	4590-1080	11	....	X10	S5	425	Triode Sect.
{6CS6	6.3	4310-5627	16	....	X1	S5	300	Grid No. 1
{6CS6	6.3	4370-5621	0	....	X1	S5	775	Grid No. 3
{6CS7	6.3	4570-6080	22	....	X4	S5	350	Triode No. 1
{6CS7	6.3	4530-1090	26	....	X10	S5	275	Triode No. 2
6CT3	6.3	4500-2090	0	45	SH	S3	750	
6CU5	6.3	4320-7610	22	....	X10	....	375	HOLD DOWN S1 AND PRESS S5
{6CU8	6.3	4570-2361	10	....	X4	S5	700	Pent. Sect.
{6CU8	6.3	4560-9010	24	....	X4	S5	500	Triode Sect.
{6CW4‡	6.3	3140-2080	10	....	X10	S4	575	USE ADAPTER SA-3, 1958-137
{Model 752A:								
{6CW4	6.3	AC40-2080	10	....	X10	S4	575	
6CW5	6.3	4520-7930	16	....	X10	S5	475	
{6CX8	6.3	4570-9660	11	....	X10	S5	400	Pent. Sect.
{6CX8	6.3	4520-3010	13	....	X4	S5	675	Triode Sect.
6CY5	6.3	4310-5620	12	....	X4	....	625	HOLD DOWN S1 AND PRESS S5
{6CY7	6.3	4570-6060	13	....	X4	S5	200	Triode No.1
{6CY7	6.3	4520-1090	60	....	X4	S5	625	Triode No.2
6CZ5	6.3	4530-9170	10	....	X4	S5	700	
6D8	6.3	6100-2354	17	....	X2	S5	500	Cap=G
{6D10‡	6.3	1C97-A546	15	....	X4	S5	500	‡Dual Triode
{6D10	6.3	1CB0-2030	15	....	X4	S5	500	Triode No. 3
6DA4	6.3	7800-5030	0	40	SH	S3	650	
{6DA5	6.3	4510-9020	Vary	100	SH	S6	....	Connect a
{1 megohm resistor from Plate jack to octal Test Socket Pin No. 7.								
{Vary Bias to very beam angle.								
6DB5	6.3	4530-9120	25	....	X10	....	375	HOLD DOWN S1 AND PRESS S5
6DC6	6.3	4310-5627	10	....	X4	S5	625	
6DE4	6.3	7800-5030	0	49	SH	S3	650	
6DE6	6.3	4310-5627	10	....	X4	S5	700	
{6DE7	6.3	4570-6080	30	....	X2	S5	625	Triode No. 1
{6DE7	6.3	4520-1090	55	....	X4	S5	775	Triode No. 2
6DG6	6.3	7250-3480	25	....	X10	....	375	HOLD DOWN S1 AND PRESS S5
6DJ8	6.3	4572-6183	20	....	X10	S5	775	‡Dual Triode

TUBE TYPE	FIL.	SELECTORS	BIAS	SHUNT	MULT.	PRESS.	MINIMUM MUT. COND.	NOTATIONS
6HS8	6.3	4570-8219	10	—	X1	S5	325	Pent. No. 1
6HS8	6.3	4570-3216	10	—	X1	S5	325	Pent. No. 2
6HT6	6.3	4520-7819	10	—	X10	S5	500	
6HV5‡	6.3	1C70-2043	0	78	SH	S1	750	
6HW8	6.3	4560-2379	14	—	X2	S5	700	
	Make external connection from Pin 8 of octal socket to plate jack and connect Pin 1 to Pin 7 on octal socket.							
6HZ5‡	6.3	1C20-7043	0	—	X20	S5	500	
6HZ6	6.3	3410-5627	10	—	X2	S5	450	
6HZ8	6.3	4570-9860	12	—	X10	S5	500	Pent. Sect.
6HZ8	6.3	4520-3010	15	—	X4	S5	550	Triode Sect.
6J4	6.3	4310-7020	15	—	X20	S5	350	
6J6	6.3	4356-2170	17	—	X10	S5	325	‡Dual Triode
6J9‡	6.3	4579-86A0	15	—	X4	S5	750	‡Triodes No. 1&2
6J9	6.3	4520-1030	15	—	X4	S5	750	Triode No. 3
6J10‡	6.3	1C70-4685	0	—	X1	S5	500	Pent. No. 1
6J10	6.3	1CB0-9230	20	—	X10	S5	375	Pent. No. 2
6J11‡	6.3	1CB0-976A	12	—	X4	S5	800	Pent. No. 1
6J11	6.3	1C50-3264	12	—	X4	S5	800	Pent. No. 2
6JA5‡	6.3	1C90-6AB0	35	—	X10	S5	375	
6JB5‡	6.3	1C90-6AB0	47	—	X2	S5	625	
6JB6‡	6.3	4520-0138	31	—	X10	—	450	CAP=P. HOLD DOWN S1 AND PRESS S5 USE ADAPTER 54-4, 1650-144
Model 752A: No Adapter Required.								
6JB8	6.3	4520-6370	26	—	X2	S5	325	Pent. Sect.
6JB8	6.3	4590-1080	23	—	X4	S5	350	Triode Sect.
6JC5‡	6.3	1C90-6AB0	29	—	X4	S5	750	
6JC6	6.3	4520-7819	10	—	X10	S5	625	
6JC8	6.3	4520-6370	10	—	X4	S5	600	Pent. Sect.
6JC8	6.3	4580-9010	10	—	X10	S5	500	Triode Sect.
6JD5‡	6.3	1C20-7043	0	—	X20	S5	500	
6JD6	6.3	4520-7819	11	—	X10	S5	550	
6JE6‡	6.3	4520-0738	42	—	X10	—	675	CAP=P. HOLD DOWN S1 AND PRESS S5 USE ADAPTER 54-4, 1650-144
Model 752A: No Adapter Required.								
6JE8	6.3	4570-9860	15	—	X10	S5	470	Pent. Sect.
6JE8	6.3	4520-3010	14		X4	S5	625	Triode Sect.
6JF6‡	6.3	4520-0738	36	—	X10	—	550	CAP=P. HOLD DOWN S1 AND PRESS S5 USE ADAPTER 54-4, 1650-144
Model 752A: No Adapter Required.								
6JF8	6.3	7150-0460	36	—	X10	—	325	PENT. SECT. CAP=P. HOLD DOWN S1 AND PRESS S5
6JF8	6.3	7100-8020	0	46	SH	S3	625	Diode Sect.
6JG5	6.3	4570-9860	15	—	X10	S5	500	
6JG6‡	6.3	4520-9736	36	—	X10	—	550	HOLD DOWN S1 AND PRESS S5 USE ADAPTER 54-4, 1650-144
Model 752A: No Adapter Required.								
6JH5‡	6.3	1C20-7043	0	—	X20	S5	500	
6JH6	6.3	4310-5627	12	—	X10	S5	375	
6JH8	6.3	4560-9371	16	—	X1	S5	400	PLATE NO. 1. BACKBOARD NEON FLASH IN SHORT TESTING
6JH8	6.3	4560-8371	16	—	X1	S5	400	PLATE NO. 2. BACKBOARD NEON FLASH IN SHORT TESTING
6JK5‡	6.3	1C20-7043	0	—	X20	S5	500	
6JK6	6.3	3410-5627	14	—	X20	S5	625	
6JK8	6.3	4570-6089	18	—	X10	S5	300	Triode No. 1
6JK8	6.3	4520-1039	16	—	X20	S5	350	Triode No. 2
6JL6	6.3	3410-5627	20	—	X10	S5	600	
6JL8	6.3	4570-9860	14	—	X10	S5	500	Pent. Sect.
6JL8	6.3	4520-3010	18	—	X4	S5	700	Triode Sect.
6JM6‡	6.3	1C50-032A	46	—	X10	S5	350	Cap=P
6JN6‡	6.3	1CB0-7324	48	—	X10	S5	350	
6JN8	6.3	4590-6780	12	—	X10	S5	375	Pent. Sect.
6JN8	6.3	4510-2030	20	—	X10	S5	450	Triode Sect.
6JQ6	6.3	4570-1396	55	—	X4	S5	600	Pent. Sect.
6JQ6	6.3	4500-6090	0	70	SH	S1	400	Diode Sect.
6JR6‡	6.3	4520-9136	79	—	X2	S5	575	USE ADAPTER 54-4, 1650-144
Model 752A: No Adapter Required.								
6JS6A‡	6.3	1C50-0324	68	—	X4	S5	600	Cap=P
6JT6‡	6.3	4520-9736	47	—	X10	S5	275	USE ADAPTER 54-4, 1650-144
Model 752A: No Adapter Required.								
6JT8	6.3	4570-9860	15	—	X10	S5	550	Pent. Sect.
6JT8	6.3	4520-3010	21	—	X2	S5	250	Triode Sect.
6JU6‡	6.3	4520-0136	79	—	X2	S5	675	CAP=P USE ADAPTER 54-4, 1650-144
Model 752A: No Adapter Required.								
6JU8	6.3	4500-2839	0	78	SH	S1	400	‡DIODE NO. 1 & NO. 3
6JU8	6.3	4500-1728	0	78	SH	S1	400	‡DIODE NO. 2 & NO. 4
6JV6‡	6.3	1CB0-732A	60	—	X10	S5	325	
6JV8	6.3	4570-9860	13	—	X10	S5	450	Pent. Sect.
6JV8	6.3	4520-3010	17	—	X4	S5	450	Triode Sect.
6JW8	6.3	4520-6370	14	—	X4	S5	775	Pent. Sect.
6JW8	6.3	4590-1080	13	—	X4	S5	550	Triode Sect.
6JY8	6.3	4570-9860	15	—	X10	S5	500	Pent. Sect.
6JY8	6.3	4520-3010	14	—	X10	S5	625	Triode Sect.
6JZ6‡	6.3	1C50-0324	63	—	X10	S5	300	Cap=P
6JZ8‡	6.3	1C70-4B90	34	—	X10	S5	300	Pent. Sect.
6JZ8	6.3	1CA0-20B0	32	—	X2	S5	450	Triode Sect.
6K6	6.3	7250-3480	17	—	X4	S5	375	
6K11‡	6.3	1C90-A048	25	—	X2	S5	675	Triode No. 1
6K11	6.3	1C78-5263	14	—	X4	S5	200	‡Dual Triode
6KA8	6.3	4560-9837	14	—	X2	S5	625	Pent. Sect.
6KA8	6.3	4520-1030	19	—	X2	S5	625	Triode Sect.
6KD6‡	6.3	1C50-0324	75	—	X4	S5	900	Cap=P
6KD8	6.3	4520-6370	6	—	X4	S5	700	Pent. Sect.
6KD8	6.3	4590-1080	17	—	X10	S5	500	Triode Sect.
6KE8	6.3	4520-6370	9	—	X10	S5	650	Pent. Sect.
6KE8	6.3	4590-1080	17	—	X10	S5	475	Triode Sect.
6KF8	6.3	4570-8219	10	—	X2	S5	225	Pent. No. 1
6KF8	6.3	4570-3216	10	—	X2	S5	225	Pent. No. 2
6KL8	6.3	4520-7631	6	—	X2	—	600	PENT. SECT. HOLD DOWN S1 AND PRESS S5
6KL8	6.3	4500-8030	0	33	SH	S1	400	Diode Sect.
6KM6‡	6.3	4620-0738	72	—	X4	S5	350	CAP=P USE ADAPTER 54-4, 1650-144
Model 752A: No Adapter Required.								

TUBE TYPE	FIL.	SELECTORS	BIAS	SHUNT	MULT.	PRESS.	MINIMUM MUT. COND.	NOTATIONS
6KM8	6.3	4570-9860	5	....	X1	....	650	TETRODE PLATE NO. 1 HOLD DOWN S1 AND PRESS S3.
6KM8	6.3	4570-2860	5	....	X1	....	650	TETRODE PLATE NO. 2 HOLD DOWN S1 AND PRESS S5.
6KM8	6.3	4570-1860	5	....	X1	....	650	TETRODE PLATE NO. 3 HOLD DOWN S1 AND PRESS S1
6KM8	6.3	4500-3060	0	36	SH	S1	400	Diode Sect.
6KN6‡	6.3	1C50-0324	68	....	X4	S5	500	Cap—P
6KR8	6.3	4570-9860	14	....	X10	S5	475	Pent. Sect.
6KR8	6.3	4520-3010	11	....	X10	S5	500	Triode Sect.
6KS6	6.3	4320-7516	0	....	X1	S5	500	LIMITER GRID
6KS6	6.3	4360-7512	0	....	X1	S5	525	GRID-STOPPER GRID
6KT6	6.3	4520-7819	9	....	X10	S5	750	
6KT8	6.3	4570-9860	10	....	X10	S5	450	Pent. Sect.
6KT8	6.3	4520-3010	20	....	X2	S5	475	Triode Sect.
6KU8	6.3	4570-9860	15	....	X10	S5	600	Pent. Sect.
6KU8	6.3	4500-3010	0	30	SH	S1	400	Diode No. 1
6KU8	6.3	4500-2010	0	30	SH	S1	400	Diode No. 2
6KV6‡	6.3	4520-9736	65	....	X4	S5	760	USE ADAPTER SA-4, 1050-144
Model 752A: No Adapter Required.								
6KV8	6.3	4570-9860	15	....	X20	S5	425	Pent. Sect.
6KV8	6.3	4520-3010	15	....	X4	S5	550	Triode Sect.
6KX8	6.3	4591-7382	14	....	X4	S5	200	‡Dual Triode
6KY6	6.3	4520-7813	13	....	X20	S5	475	
6KY8‡	6.3	4520-6730	42	....	X10	S5	325	PENT. SECT. USE ADAPTER SA-4, 1050-144
6KY8	6.3	4590-8010	18	....	X4	S5	200	Triode Sect.
Model 752A: No Adapter Required.								
6KZ8	6.3	4520-6730	14	....	X4	S5	625	Pent. Sect.
6KZ8	6.3	4590-1080	18	....	X10	S5	400	Triode Sect.
6L6	6.3	7250-3481	17	....	X10	S5	300	
6LB6‡	6.3	1C50-0324	33	....	X10	S4	750	Cap—P
6LB8	6.3	4570-9860	16	....	X10	S5	550	Pent. Sect.
6LB8	6.3	4520-3010	17	....	X10	S5	350	Triode Sect.
6LC6	6.3	2700-5601	0	50	SH	S1	500	Cap—G
6LC8	6.3	4560-9873	14	....	X2	S5	625	Pent. Sect.
6LC8	6.3	4520-1030	19	....	X2	S5	625	Triode Sect.
6LD6	6.3	4520-7819	13	....	X10	S5	840	
6LE8	6.3	4590-6837	12	....	X2	S5	450	Pent. No. 1
6LE8	6.3	4590-1832	12	....	X2	S5	450	Pent. No. 2
6LF6‡	6.3	1C50-0324	77	....	X4	S5	750	Cap—P
6LF8	6.3	4570-9860	11	....	X10	S5	475	Pent. Sect.
6LF8	6.3	4520-3010	16	....	X4	S5	500	Triode Sect.
6LG6‡	6.3	1C50-0840	73	....	X10	S5	420	Cap—P
6LH6	6.3	2700-5061	0	50	SH	S1	500	Cap—G
6LJ6	6.3	2700-5063	0	50	SH	S1	500	Cap—G
6LJ8	6.3	4590-6780	10	....	X10	S5	625	Pent. Sect.
6LJ8	6.3	4510-2030	10	....	X10	S5	500	Triode Sect.
6LM8	6.3	4520-6370	15	....	X4	S5	550	Pent. Sect.
6LM8	6.3	4590-1080	17	....	X10	S5	450	Triode Sect.
6LN8	6.3	4520-6371	12	....	X4	S5	625	Pent. Sect.
6LN8	6.3	4590-1086	26	....	X4	S5	675	Triode Sect.
6LQ6‡	6.3	4520-0738	42	....	X10	....	575	CAP—P. HOLD DOWN S1 AND PRESS S3 USE ADAPTER SA-4, 1050-144
Model 752A: No Adapter Required.								
6LQ8	6.3	4570-9860	15	....	X20	S5	425	Pent. Sect.
6LQ8	6.3	4520-3010	11	....	X10	S5	500	Triode Sect.
6LR6‡	6.3	1C50-0324	80	....	X4	S5	2500	Cap—P
6LR8‡	6.3	4520-6730	40	....	X10	S5	350	PENT. SECT. USE ADAPTER SA-4, 1050-144
6LR8	6.3	4590-8010	21	....	X4	S5	350	Triode Sect.
Model 752A: No Adapter Required.								
6LT8	6.3	4590-3210	10	....	X10	S5	450	Pent. Sect.
6LT8	6.3	4500-6870	0	80	SH	S1	650	‡Dual Diode
6LU6	6.3	4310-5627	10	....	X10	S5	375	
6LU8‡	6.3	1C60-4890	40	....	X10	S5	350	Pent. Sect.
6LU8	6.3	1CA0-2080	21	....	X4	S5	350	Triode Sect.
6LW6	6.3	8750-0320	70	....	X10	S5	475	Cap—P
6LX6‡	6.3	1C50-0324	75	....	X4	S5	900	Cap—P
6LY8	6.3	4570-9860	21	....	X10	S5	450	Pent. Sect.
6LY8	6.3	4520-3010	17	....	X2	S5	400	Triode Sect.
6M3	OFF	8200-0000	Use This Setting For Short Check Only.					
6M3	6.3	8200-0030	0	65	SH	....	650	CAP—P. SHORT ON 1-2-3-4 HOLD DOWN S3 AND PRESS S1
Model 752A:								
6M3	6.3	8200-3000	0	65	SH	S3	650	Cap—K
6M11‡	6.3	1C20-B3A0	10	....	X10	S5	550	Pent. Sect.
6M11	6.3	1C85-7694	16	....	X10	S5	375	‡Dual Triode
6MA6	6.3	3800-6074	0	50	SH	S1	500	Cap—G
6MB6‡	6.3	1C50-0324	75	....	X4	S5	900	Cap—P
6MB8	6.3	4590-6780	8	....	X10	S5	550	Pent. Sedct.
6MB8	6.3	4510-2030	12	....	X10	S5	525	Triode Sect.
6MC6‡	6.3	4520-0738	75	....	X4	S5	900	CAP—P USE ADAPTER SA-4, 1050-144
Model 752A: No Adapter Required.								
6MD8‡	6.3	4568-3270	27	....	X4	S5	575	STRIODES NO. 1 & NO. 2 USE ADAPTER SA-4, 1050-144
6MD8	6.3	4590-1070	27	....	X4	S5	575	Triode No. 3
Model 752A: No Adapter Required.								
6ME6‡	6.3	4520-0738	42	....	X10	....	575	CAP—P. HOLD DOWN S1 AND PRESS S3. USE ADAPTER SA-4, 1050-144
Model 752A: No Adapter Required.								
6ME8	6.3	4560-9372	23	....	X2	S5	250	Plate No. 1
6ME8	6.3	4560-8372	23	....	X2	S5	250	Plate No. 2
6MF8‡	6.3	1C70-4890	34	....	X4	S5	750	Pent. Sect.
6MF8	6.3	1CA0-20B0	21	....	X4	S5	750	Triode Sect.
6MG8	6.3	4520-6370	10	....	X10	S5	325	Pent. Sect.
6MG8	6.3	4590-1080	10	....	X10	S5	525	Triode Sect.
6MH6‡	6.3	1C50-0324	75	....	X4	S5	900	Cap—P
6MJ8‡	6.3	1CB0-2030	30	....	X4	S5	600	Triode No. 1
6MJ8	6.3	1CA8-4630	30	....	X4	S5	600	‡Dual Triode
6MK8	6.3	4570-8219	0	....	X2	....	175	PENT. NO. 1. HOLD DOWN S1 AND PRESS S3
6MK8	6.3	4570-3216	0	....	X2	....	175	PENT. NO. 2. HOLD DOWN S1 AND PRESS S5
6ML8	6.3	4568-3270	15	....	X10	S5	470	‡Dual Triode
6ML8	6.3	4590-1070	15	....	X10	S5	470	Triode No. 3
6MN8‡	6.3	1C80-6030	21	....	X4	S5	650	Triode No. 1
6MN8	6.3	1CA8-4230	21	....	X4	S5	650	‡Dual Triode

TUBE TYPE	FIL.	SELECTORS	BIAS	SHUNT	MULT.	PRESS.	MINIMUM MUT. COND.	NOTATIONS
6MQ8	6.3	4520-6370	10	....	X10	S5	450	Pent. Sect.
6MQ8	6.3	4590-1080	10	....	X10	S5	600	Triode Sect.
6MU8	6.3	4520-6370	15	....	X10	S5	460	Pent. Sect.
6MU8	6.3	4590-1080	15	....	X10	S5	440	Triode Sect.
6MV8	6.3	4570-9860	15	....	X4	S5	700	Pent. Sect.
6MV8	6.3	4520-3010	15	....	X4	S5	440	Triode Sect.
6MY8‡	6.3	1C60-4890	40	....	X10	S5	350	Pent. Sect.
6MY8	6.3	1CA0-20B0	21	....	X4	S5	350	Triode Sect.
6Q11‡	6.3	1C90-A048	25	....	X2	S5	675	Triode No. 1
6Q11	6.3	1C7B-5263	14	....	X4	S5	200	ΣDual Triode
6R4	6.3	4510-8030	28	....	X4	S5	625	
6S4	6.3	4560-9020	21	....	X4	S5	700	
6SN7	6.3	7841-5263	23	....	X4	S5	400	ΣDual Triode
6T4	6.3	4320-1050	16	....	X10	S4	400	
6T8	6.3	4560-9076	15	....	X4	S5	175	Triode Sect.
6T8	6.3	4500-6273	0	78	SH	S1	400	ΣDual Diode
6T8	6.3	4500-1078	0	78	SH	S1	400	Diode No. 3
6T9‡	6.3	1C80-8A90	12	....	X10	S5	450	Pent. Sect.
6T9	6.3	1C40-2050	16	....	X4	S5	200	Triode Sect.
6T10‡	6.3	1C80-8A90	20	....	X10	S5	375	Pent. No. 1
6T10	6.3	1C30-7625	15	....	X2	S5	200	Pent. No. 2
6U8	6.3	4520-6370	12	....	X4	S5	475	Pent. Sect.
6U8	6.3	4590-1080	10	....	X10	S5	525	Triode Sect.
6U9‡	6.3	5630-7824	14	....	X10	S5	375	PENT. SECT. USE ADAPTER SA-11, 1650-172.
6U9	6.3	56A0-9010	30	....	X10	S5	300	Triode Sect.
6U10‡	6.3	1C9B-A243	27	....	X2	S5	625	ΣTRIODES NO. 1 AND 2
6U10	6.3	1C70-5060	20	....	X2	S5	175	Triode No. 2
6V3	OFF	4500-0000	Use This Setting For Short Check Only.					
6V3	6.3	4500-0020	0	60	SH	---	650	CAP.-P. SHORT ON 1-1-3-4 HOLD DOWN S3 AND PRESS S2
Model 752A:								
6V3	6.3	4500-2000	0	60	SH	S3	650	Cap.-K
6V5	6.3	7850-3400	46	....	X4	S5	650	
6V6	6.3	7250-3481	18	....	X4	S5	575	
6V9‡	6.3	5630-7412	15	....	X1	....	700	PENT. SECT. HOLD DOWN S1 AND PRESS S2. USE ADAPTER SA-11, 1650-172.
6V9	6.3	5680-A090	23	....	X4	S5	650	Triode Sect.
6W4	6.3	7800-5030	0	60	SH	S3	650	
6W6	6.3	7250-3480	25	....	X10	....	375	HOLD DOWN S1 AND PRESS S2
6X4	6.3	4300-6170	0	18	SH	S3	650	ΣDual Diode
6X5	6.3	7200-5381	0	20	SH	S3	650	ΣDual Diode
6X6	6.3	2753-4086	100	100	SH	S6	.....	Eyes Open
6X6	6.3	2750-4386	100	100	SH	S6	.....	Eyes Closed
6X8	6.3	4570-9861	10	....	X4	S5	725	Pent. Sect.
6X8	6.3	4520-3061	15	....	X10	S5	350	Triode Sect.
6X9‡	6.3	5630-7824	15	....	X10	S5	375	PENT. SECT. USE ADAPTER SA-11, 1650-172.
6X9	6.3	56A0-9010	14	....	X4	S5	750	Triode Sect.
6Y9‡	6.3	5680-A970	16	....	X10	S5	650	PENT. NO. 1. USE ADAPTER SA-11, 1650-171.
6Y9	6.3	5610-4320	12	....	X10	S5	450	Pent. No. 2
6Y10‡	6.3	1C80-8A90	21	....	X4	S5	750	Pent. No. 1
6Y10	6.3	1C30-7625	13	....	X2	S5	575	Pent. No. 2
6Z4	6.3	5100-3240	0	75	SH	S3	650	
6Z5	6.3	1600-5040	0	30	SH	S3	650	Plate No. 1
6Z5	6.3	2100-3040	0	30	SH	S3	650	Plate No. 2
6Z10‡	6.3	1C70-4685	0	....	X1	S5	500	Pent. No. 1
6Z10	6.3	1CB0-9230	20	....	X10	S5	375	Pent. No. 2
7AU7	6.3	4572-6183	25	---	X2	S5	675	ΣDual Triode
7DJ8	7.5	4572-6183	20	---	X10	S5	775	ΣDual Triode
7EY6	7.5	7250-3480	29	---	X4	S5	675	
7HG8	7.5	4520-8930	11	---	X10	S5	475	Pent. Sect.
7HG8	7.5	4560-7030	33	....	X10	S5	350	Triode Sect.
7KY6	7.5	4520-7813	13	....	X20	S5	475	
7KZ6	7.5	4520-7813	13	....	X10	S5	825	
8AC9‡	7.5	1C90-BA87	11	....	X10	S5	450	Pent. Sect.
8AC9	7.5	1C00-3040	0	87	SH	S1	400	Diode No. 1
8AC9	7.5	1C00-2030	0	87	SH	S1	400	Diode No. 2
8AC10‡	10.0	1C90-A040	11	---	X4	S5	650	Triode No. 1
8AC10	10.0	1C7B-5263	11	---	X4	S5	650	ΣDUAL TRIODE SET "LINE ADJUST" TO #1 ON 0-10 SCALE.
8AL9‡	7.5	1C80-2A94	5	....	X10	S5	690	Pent. Sect.
8AL9	7.5	1C50-7060	14	....	X10	S5	395	Triode Sect.
8AR11‡	7.5	1CA0-89B7	6	....	X10	S5	550	Pent. No. 1
8AR11	7.5	1C50-2364	5	....	X10	S5	550	Pent. No. 2
8AU8	7.5	4570-9860	10	....	X10	S5	375	Pent. Sect.
8AU8	7.5	4520-3010	13	....	X10	S5	300	Triode Sect.
8AV11‡	7.5	1C97-A546	23	....	X2	S5	750	ΣTRIODE NO. 1 AND NO. 2
8AV11	7.5	1C80-2030	23	....	X2	S5	750	Triode No. 3
8AW8A	7.5	4570-9863	14	....	X10	S5	475	Pent. Sect.
8AW8A	7.5	4520-3019	13	....	X10	S5	250	Triode Sect.
8B10‡	10.0	1C53-6472	24	....	X2	S5	600	ΣDUAL TRIODE SET "LINE ADJUST" TO #3
8B10	10.0	1C00-A890	0	70	SH	S1	400	ΣDual Diode
8BA8A	7.5	4570-9860	10	....	X10	S5	375	Pent. Sect.
8BA8A	7.5	4520-3010	29	....	X4	S5	425	Triode Sect.
8BA11‡	7.5	1C40-6387	10	....	X1	S5	325	Pent. No. 1
8BA11	7.5	1C40-2385	10	....	X1	S5	325	Pent. No. 2
8BA11	7.5	1C90-B0A0	30	....	X2	S5	550	Triode Sect.
8BH8	7.5	4570-9860	8	---	X10	S5	375	Pent. Sect.
8BH8	7.5	4520-3010	26	....	X4	S5	500	Triode Sect.
8BM11‡	7.5	1CB0-79A8	10	....	X10	S5	400	Pent. No. 1
8BM11	7.5	1C60-2354	12	....	X10	S5	350	Pent. No. 2
8BN8	7.5	4580-7090	15	....	X4	S5	400	Triode Sect.
8BN8	7.5	4500-6132	0	78	SH	S1	400	ΣDual Diode
8BN11‡	10.0	1C70-B98A	10	....	X10	S5	625	SET "LINE ADJUST" TO #25 ON 1-10 SCALE. PENT. NO. 1
8BN11	10.0	1C30-5426	10	....	X10	S5	525	Pent. No. 2
8BQ5	7.5	4520-7930	14	....	X10	S5	475	
8BQ11‡	7.5	1CA0-89B7	8	....	X10	S5	500	Pent. No. 1
8BQ11	7.5	1C50-2364	8	....	X10	S5	625	Pent. No. 2
8BU11‡	7.5	1C80-A9B0	10	....	X4	S5	700	Pent. Sect.
8BU11	7.5	1C64-7352	16	....	X10	S5	450	ΣDual Triode
8CB11‡	7.5	1CA0-89B7	10	....	X10	S5	450	Pent. No. 1
8CB11	7.5	1C50-2364	10	....	X10	S5	450	Pent. No. 2

TUBE TYPE	FIL.	SELECTORS	BIAS	SHUNT	MULT.	PRESS.	MINIMUM MUT. COND.	NOTATIONS

TUBE TYPE	FIL.	SELECTORS	BIAS	SHUNT	MULT.	PRESS.	MINIMUM MUT. COND.	NOTATIONS
8CM7	7.5	4570–6030	27	—	X4	S5	300	Triode No. 1
8CM7	7.5	4580–1090	23	—	X10	S5	275	Triode No. 2
8CN7	7.5	4570–8060	15	—	X4	S5	325	Triode Sect.
8CN7	7.5	4500–2130	0	78	SH	S1	400	‡Dual Diode
8CS7	7.5	4570–6080	22	—	X4	S5	350	Triode No. 1
8CS7	7.5	4530–1090	26	—	X10	S5	275	Triode No. 2
8CW5	7.5	4520–7930	16	—	X10	S5	475	
8CX8	7.5	4570–9860	11	—	X10	S5	400	Pent. Sect.
8CX8	7.5	4520–3010	13	—	X4	S5	675	Triode Sect.
8EB8	7.5	4570–9860	0	—	X10	S5	625	Pent. Sect.
8EB8	7.5	4520–3010	10	—	X2	S5	625	Triode Sect.
8EM5	7.5	4530–9170	16	—	X10	S5	325	
8ET7	7.5	4570–9860	11	—	X10	S5	500	Pent. Sect.
8ET7	7.5	4500–3210	0	18	SH	S1	400	‡Dual Diode
8FQ7	7.5	4572–6183	23	—	X4	S5	400	‡Dual Triode
8GK6	7.5	4520–7813	10	—	X10	S5	575	
8GN8	7.5	4570–9860	15	—	X10	S5	500	Pent. Sect.
8GN8	7.5	4520–3010	16	—	X2	S5	450	Triode Sect.
8GU7	7.5	4572–6183	33	—	X4	S5	400	‡Dual Triode
8GX7	7.5	4520–6710	11	—	X10	S5	450	Pent. Sect.
8GX7	7.5	4590–8010	15	—	X10	S5	600	Triode Sect.
8JL8	7.5	4570–9860	14	—	X10	S5	500	Pent. Sect.
8JL8	7.5	4520–3010	18	—	X4	S5	700	Triode Sect.
8JU8	7.5	4500–2839	0	78	SH	S1	400	‡Diode 1 and 3
8JU8	7.5	4500–1728	0	78	SH	S1	400	‡Diode 2 and 4
8JV8	7.5	4570–9860	13	—	X10	S5	450	Pent. Sect.
8JV8	7.5	4520–3010	17	—	X4	S5	450	Triode Sect.
8K11‡	7.5	1C90–A048	25	—	X2	S5	675	Triode No. 1
8K11	7.5	1C7B–5263	14	—	X4	S5	200	‡Dual Triode
8KA8	7.5	4560–9837	14	—	X2	S5	625	Pent. Sect.
8KA8	7.5	4520–1030	19	—	X2	S5	625	Triode Sect.
8KR8	7.5	4570–9860	14	—	X10	S5	475	Pent. Sect.
8KR8	7.5	4520–3010	11	—	X10	S5	500	Triode Sect.
8LC8	7.5	4560–9873	14	—	X2	S5	625	Pent. Sect.
8LC8	7.5	4520–1030	19	—	X2	S5	625	Triode Sect.
8LT8	7.5	4590–3216	10	—	X10	S5	450	Pent. Sect.
8LT8	7.5	4500–6870	0	80	SH	S1	650	‡Dual Diode
8MU8	7.5	4520–6370	15	—	X10	S5	460	Pent. Sect.
8MU8	7.5	4590–1080	15	—	X10	S5	440	Triode Sect.
8U9‡	7.5	5630–7824	14	—	X10	S5	375	PENT. SECT. USE ADAPTER 5A-31, 1000-171.
8U9	7.5	56A0–9010	30	—	X10	S5	300	Triode Sect.
8X9‡	7.5	5630–7824	15	—	X10	S5	375	PENT. SECT. USE ADAPTER 5A-31, 1000-171.
8X9	7.5	56A0–9010	14	—	X4	S5	750	Triode Sect.
9AH9‡	10.0	1C50–6879	16	—	X10	S5	750	Pent. Sect.
9AH9	10.0	1C20–3040	29	—	X4	S5	625	Triode Sect.
9AK10‡	10.0	1C90–A040	17	—	X4	S5	725	Triode No. 1
9AK10	10.0	1C70–5060	17	—	X4	S5	725	Triode No. 2
9AK10	10.0	1C80–2030	17	—	X4	S5	725	Triode No. 3
9AU7	10.0	4572–6183	25	—	X2	S5	675	‡Dual Triode
9BJ11‡	10.0	1C80–79A8	10	—	X2	S5	500	Pent. No. 1
9BJ11	10.0	1C60–2354	11	—	X10	S5	450	Pent. No. 2

TUBE TYPE	FIL.	SELECTORS	BIAS	SHUNT	MULT.	PRESS.	MINIMUM MUT. COND.	NOTATIONS
9EA8	10.0	4520–6370	9	—	X4	S5	550	Pent. Sect.
9EA8	10.0	4590–1080	10	—	X10	S5	525	Triode Sect.
9GH8	10.0	4520–6370	11	—	X4	S5	625	Pent. Sect.
9GH8	10.0	4590–1080	13	—	X10	S5	525	Triode Sect.
9JW8	10.0	4520–6370	14	—	X4	S5	775	Pent. Sect.
9JW8	10.0	4590–1080	13	—	X4	S5	550	Triode Sect.
9KC6	7.5	4520–7916	10	—	X10	S5	550	
9KX6	7.5	4520–7813	11	—	X20	S5	475	
9KZ8	10.0	4520–6730	14	—	X4	S5	625	Pent. Sect.
9KZ8	10.0	4590–1080	18	—	X10	S5	400	Triode Sect.
9LA6	7.5	4520–7813	14	—	X10	S5	575	
9ML8	10.0	4568–3270	15	—	X10	S5	470	‡Dual Triode
9ML8	10.0	4590–1070	15	—	X10	S5	470	Triode No. 3
9MN8‡	10.0	1C80–6030	21	—	X4	S5	650	Triode No. 1
9MN8	10.0	1CA8–4230	21	—	X4	S5	650	‡Dual Triode
9R-AL1	10.0	4570–6080	33	—	X2	S5	670	Triode No. 1
9R-AL1	10.0	4530–1090	36	—	X4	S5	670	Triode No. 2
9V9‡	10.0	5630–7412	15	—	X1	—	700	GRPT. SECT. HOLD DOWN S1 AND PRESS 2S. USE ADAPTER 5A-11, 1000-171.
9V9	10.0	5680–A090	23	—	X4	S5	650	Triode Sect.
10AL11‡	10.0	1C80–BA90	19	—	X10	S5	400	Pent. No. 1
10AL11	10.0	1C30–6724	22	—	X2	S5	300	Pent. No. 2
10BQ5	10.0	4520–7930	14	—	X10	S5	475	
10CW5	10.0	4520–7930	16	—	X10	S5	475	
10DE7	10.0	4570–6080	30	—	X2	S5	625	Triode No. 1
10DE7	10.0	4520–1090	55	—	X4	S5	775	Triode No. 2
10DR7	10.0	4570–6080	13	—	X2	S5	375	Triode No. 1
10DR7	10.0	4520–1090	55	—	X4	S5	850	Triode No. 2
10EG7	10.0	7840–5060	29	—	X2	S5	625	Triode No. 1
10EG7	10.0	7810–2030	55	—	X10	S5	475	Triode No. 2
10EM7	10.0	7840–5060	13	—	X2	S5	500	Triode No. 1
10EM7	10.0	7810–2030	60	—	X10	S5	425	Triode No. 2
10GF7‡	10.0	4590–8010	20	—	X2	S5	250	TRIODE NO. 1 USE ADAPTER 5A-4, 1000-110
10GF7	10.0	4520–6030	64	—	X10	S5	450	Triode No. 2
Model 752A: No Adapter Required.								
10GK6	10.0	4520–7813	10	—	X10	S5	575	
10GN8	10.0	4570–9860	15	—	X10	S5	500	Pent. Sect.
10GN8	10.0	4520–3010	16	—	X2	S5	450	Triode Sect.
10GV8	10.0	4590–6780	36	—	X10	S5	375	Pent. Sect.
10GV8	10.0	4520–1030	23	—	X2	S5	950	Triode Sect.
10HF8	10.0	4570–9860	11	—	X10	S5	475	Pent. Sect.
10HF8	10.0	4520–3010	15	—	X4	S5	500	Triode Sect.
10J10‡	10.0	1C70–4685	0	—	X1	S5	500	Pent. No. 1
10J10	10.0	1CB0–9230	20	—	X10	S5	375	Pent. No. 2
10JA5‡	10.0	1C90–6AB0	35	—	X10	S5	375	
10JA8	10.0	4570–9860	12	—	X10	S5	525	Tetrode Sect.
10JA8	10.0	4520–3010	23	—	X2	S5	475	Triode Sect.
10JT8	10.0	4570–9860	15	—	X10	S5	550	Pent. Sect.
10JT8	10.0	4520–3010	21	—	X2	S5	250	Triode Sect.
10JY8	10.0	4570–9860	15	—	X10	S5	500	Pent. Sect.
10JY8	10.0	4520–3010	14	—	X10	S5	625	Triode Sect.

TUBE TYPE	FIL.	SELECTORS	BIAS	SHUNT	MULT.	PRESS.	MINIMUM MUT. CONDUCTANCE	NOTATIONS
10KR8	10.0	4570-9860	14	....	X10	S5	475	Pent. Sect.
10KR8	10.0	4520-3010	11	....	X10	S5	500	Triode Sect.
10KU8	10.0	4570-9860	15	....	X10	S5	600	Pent. Sect.
10KU8	10.0	4500-3010	0	30	SH	S1	400	Diode No. 1
10KU8	10.0	4500-2010	0	30	SH	S1	400	Diode No. 2
10LB8	10.0	4570-9860	16	....	X10	S5	550	Pent. Sect.
10LB8	10.0	4520-3010	17	....	X10	S5	350	Triode Sect.
10LD6	10.0	4520-7819	13	....	X10	S5	840	
10LE8	10.0	4590-6837	12	....	X2	S5	450	Pent. No. 1
10LE8	10.0	4590-1832	12	....	X2	S5	450	Pent. No. 2
10LW8	10.0	4570-9860	15	....	X10	S5	600	Pent. Sect.
10LW8	10.0	4520-3010	18	....	X4	S5	350	Triode Sect.
10LY8	10.0	4570-9860	21	....	X10	S5	450	Pent. Sect.
10LY8	10.0	4520-3010	17	....	X2	S5	400	Triode Sect.
10LZ8	10.0	4570-9860	11	....	X10	S5	375	Pent. Sect.
10LZ8	10.0	4520-3010	17	....	X4	S5	150	Triode Sect.
10T10‡	10.0	1C80-BA90	20	....	X10	S5	375	Pent. No. 1
10T10	10.0	1C30-7625	15	....	X2	S5	200	Pent. No. 2
10Z10‡	10.0	1C70-4585	0	....	X1	S5	500	Pent. No. 1
10Z10	10.0	1CB0-9230	20	....	X10	S5	375	Pent. No. 2
10WP7	6.3	7230-5084	0	78	SH	S1	650	EMISSION TEST
10WP7	6.3	7250-3084	#	0	SH	S6	....	GRID CONTROL & GAS TEST

Hold down S6 and rotate bias dial. Meter pointer should move up and down scale if grid is operating.
Gas Test: Adjust bias until meter reads one small division. Hold down S6 and press S7. If meter pointer moves up scale more than one division, tube is gassy. Use Hickok Adapter Code No. 1050-28

11AF9‡	12.6	5680-A970	16	....	X10	S5	650	PENT. NO. 1. USE ADAPTER SA-11, PAGE 177
11AF9	12.6	5610-4320	12	....	X10	S5	450	Pent. No. 2
11AR11‡	12.6	1CA0-89B7	5	....	X10	S5	525	PENT. NO. 1 SET "LINE ADJUST" TO 6
11AR11	12.6	1C50-2364	5	....	X10	S5	525	Pent. No. 2
11BQ11‡	12.6	1CA0-89B7	10	....	X10	S5	350	PENT. NO. 1. SET "LINE ADJUST" TO 6 ON 300 SCALE
11BQ11	12.6	1C50-2364	10	....	X10	S5	375	Pent. No. 2
11BT11‡	10.0	1CB0-2A86	10	....	X20	S5	475	Pent. Sect.
11BT11	10.0	1C50-7060	12	....	X4	S6	850	Triode No. 1
11BT11	10.0	1C30-9040	20	....	X4	S5	750	Triode No. 2
11CA11‡	10.0	1C80-BA97	22	....	X4	S5	750	Pent. Sect.
11CA11	10.0	1C60-4050	14	....	X4	S5	750	Triode No. 1
11CA11	10.0	1C30-2070	14	....	X4	S5	700	Triode No. 2
11CF11‡	10.0	1C50-3460	10	....	X10	S5	825	Pent. Sect.
11CF11	10.0	1C90-A080	12	....	X10	S5	350	Triode No. 1
11CF11	10.0	1CB0-2070	13	....	X10	S5	400	Triode No. 2
11CY7	10.0	4570-6080	13	....	X4	S5	200	Triode No. 1
11CY7	10.0	4520-1090	60	....	X4	S5	625	Triode No. 2
11DS5	12.6	4310-5620	14	....	X10	S6	600	SET "LINE ADJUST" TO 6 ON 300 SCALE
11FY7‡	10.0	1CA0-B090	21	....	X2	S5	225	Triode No. 1
11FY7	10.0	1C30-5070	59	....	X4	S5	475	Triode No. 2
11HM7	10.0	4520-7819	10	....	X20	S5	500	

TUBE TYPE	FIL.	SELECTORS	BIAS	SHUNT	MULT.	PRESS.	MINIMUM MUT. CONDUCTANCE	NOTATIONS
11JE8	10.0	4570-9860	15	....	X10	S5	475	Pent. Sect.
11JE8	10.0	4520-3010	14	....	X4	S5	625	Triode Sect.
11KV8	10.0	4570-9860	15	....	X20	S6	425	Pent. Sect.
11KV8	10.0	4520-3010	15	....	X4	S5	550	Triode Sect.
11LQ8	10.0	4570-9860	15	....	X20	S5	425	Pent. Sect.
11LQ8	10.0	4520-3010	11	....	X10	S5	500	Triode Sect.
11LT8	12.6	4590-3216	13	....	X10	S5	375	PENT. SECT. SET "LINE ADJUST" TO 10 ON 300 SCALE
11LT8	12.6	4500-6870	0	77	SH	S1	750	‡Dual Diode
11LY6	12.6	4520-7813	0	....	X10	S5	500	
11MS8	12.6	4590-6780	52	....	X4	S5	825	Pent. Sect.
11MS8	12.6	4520-1030	24	....	X4	S5	650	Triode Sect.
11Y9‡	10.0	5680-A970	16	....	X10	S5	650	PENT. NO. 1. USE ADAPTER SA-11, PAGE 177.
11Y9	10.0	5610-4320	12	....	X10	S5	450	Pent. No. 2
12AC10‡	12.6	1C90-A040	11	....	X10	S5	450	Triode No. 1
12AC10	12.6	1C78-5263	11	....	X10	S5	450	‡Dual Triode
12AE10‡	12.6	1C80-BA90	25	....	X4	S5	425	Pent. No. 1
12AE10	12.6	1C30-7625	23	....	X2	S5	250	Pent. No. 2
12AF3	12.6	4500-2000	0	44	SH	S3	650	CONNECT CAP TO EXT. GRID SIDE RED, MARK MODEL 752A-6AP-K
Model 752A:								
12AL5	12.6	4300-7215	0	78	SH	S1	400	‡Dual Diode
12AL11‡	12.6	1C80-BA90	19	....	X10	S5	400	Pent. No. 1
12AL11	12.6	1C30-6724	22	....	X2	S5	300	Pent. No. 2
12AQ5	12.6	4310-5620	18	....	X4	S5	575	
12AT6	12.6	4310-7020	15	....	X4	S5	175	Triode Sect.
12AT6	12.6	4300-6527	0	30	SH	S1	400	‡Dual Diode
12AT7	12.6	4572-6183	14	....	X4	S5	625	‡Dual Triode
12AU6	12.6	4310-5672	10	....	X4	S6	475	
12AU7	12.6	4572-6183	25	....	X2	S5	675	‡Dual Triode
12AV5	12.6	7210-5830	28	....	X10	S4	350	
12AV6	12.6	4310-7025	14	....	X4	S5	200	Triode Sect.
12AV6	12.6	4300-6527	0	30	SH	S1	400	‡Dual Diode
12AV7	12.6	4572-6183	10	....	X10	S5	525	‡Dual Triode
12AX3‡	12.6	1C00-4070	0	40	SH	S3	650	
12AX7	12.6	4572-6183	14	....	X4	S5	200	‡Dual Triode
12AY3‡	12.6	4500-2090	0	52	SH	S3	650	USE ADAPTER TA-4, PAGE 144
Model 752A:		No Adapter Required.						
12AY7	12.6	4572-6183	15	....	X4	S5	275	‡Dual Triode
12AZ7	12.6	4572-6183	14	....	X4	S5	625	‡Dual Triode
12B4	12.6	4520-9010	50	....	X10	S6	400	
12BA6	12.6	4310-5672	0	....	X4	S5	500	
12BA7	12.6	4570-9132	0	....	X2	....	225	AMPL. SECT. HOLD DOWN S1 AND PRESS S5.
12BA7	12.6	4520-1037	16	....	X10	S5	500	Osc. Sect.
12BD6	12.6	4310-5672	10	....	X4	S5	300	
12BE3‡	12.6	1C00-A070	0	58	SH	S3	650	
12BE6	12.6	4370-5621	0	....	X2	....	250	AMPL. SECT. HOLD DOWN S1 AND PRESS S5.
12BE6	12.6	4310-6027	20	....	X10	S5	400	Osc. Sect.
12BF6	12.6	4310-7020	21	....	X2	S5	600	Triode Sect.
12BF6	12.6	4300-6527	0	30	SH	S1	400	‡Dual Diode

TUBE TYPE	FIL.	SELECTORS	BIAS	SHUNT	MULT.	PRESS.	MINIMUM MUT. COND.	NOTATIONS
12BF11‡	12.6	1C80-BA90	30	—	X10	S5	375	Pent. No. 1
12BF11	12.6	1C30-7625	17	—	X2	S5	200	Pent. No. 2
12BH7	12.6	4572-6183	28	—	X4	S5	475	‡Dual Triode
12BN6	12.6	4320-7516	0	—	X1	S5	500	Limiter Grid
12BN6	12.6	4360-7512	0	—	X1	S5	525	GRADACTURE 4360
12BQ6	12.6	7250-0480	28	—	X10	S4	350	Cap—P
12BS3‡	12.6	4500-2090	0	60	SH	S3	400	USE ADAPTER 53-4, 1000-144
Model 752A:		No Adapter Required.						
12BT3‡	12.6	1C00-4070	0	60	SH	S3	650	
12BV11‡	12.6	1C70-A98B	13	—	X4	S5	400	Pent. No. 1
12BV11	12.6	1C60-3452	13	—	X4	S5	400	Pent. No. 2
12BY3	12.6	4500-2000	0	60	SH	S3	650	CONNECT CAP TO EXT. SELF BIAS RES. SELECT MODEL 2020-CAP-E
Model 752A:								
12BY7	12.6	4520-7813	0	—	X10	S5	500	
12BZ6	12.6	4310-5627	10	—	X4	S5	700	
12C5	12.6	4320-7610	13	—	X10	—	475	HOLD DOWN 51 AND PRESS 36
12CA5	12.6	3420-7610	0	—	X10	S5	425	
12CK3‡	12.6	4500-2090	0	83	SH	S1	650	USE ADAPTER 53-4, 1000-144
Model 752A:		No Adapter Required.						
12CL3‡	12.6	4500-2090	0	83	SH	S1	650	USE ADAPTER 53-4, 1000-144
Model 752A:		No Adapter Required.						
12CR6	12.6	4370-5612	11	—	X4	S5	350	Pent. Sect.
12CR6	12.6	4300-2010	0	30	SH	S1	400	Diode Sect.
12CS6	12.6	4310-5627	16	—	X1	S5	300	Grid No. 1
12CS6	12.6	4370-5621	0	—	X1	S5	775	Grid No. 3
12CT3	12.6	4500-2090	0	45	SH	S3	750	
12CU5	12.6	4320-7610	22	—	X10	—	375	HOLD DOWN 51 AND PRESS 36
12CU6	12.6	7250-0480	28	—	X10	S4	350	Cap—P
12D4	12.6	7800-5030	0	40	SH	S3	650	
12DB5	12.6	4530-9120	25	—	X10	—	375	HOLD DOWN 51 AND PRESS 36
12DJ8	12.6	4572-6183	20	—	X10	S5	775	‡Dual Triode
12DM4	12.6	7800-5030	0	49	SH	S3	650	
12DM5	12.6	4320-7610	13	—	X10	—	475	HOLD DOWN 51 AND PRESS 36
12DQ6	12.6	7250-0480	36	—	X10	—	300	CAP—P HOLD DOWN 51 AND PRESS 36
12DT5	12.6	4530-9170	22	—	X10	S5	300	
12DT8	12.6	4310-5627	12	—	X1	S5	375	Grid No. 1
12DT8	12.6	4370-5621	8	—	X1	S5	300	Grid No. 3
12DT7	12.6	4572-6183	14	—	X4	S5	200	‡Dual Triode
12DT8	12.6	4572-6183	14	—	X4	S5	625	‡Dual Triode
12DW4‡	12.6	4500-2090	0	55	SH	S3	650	USE 53-4, 1000-144
Model 752A:		No Adapter Required.						
12DW7	12.6	4570-6080	14	—	X4	S5	200	Triode No. 1
12DW7	12.6	4520-1030	25	—	X2	S5	575	Triode No. 2
12FK6	12.6	4310-7020	20	0	SH	S1	400	TRIODE SECT. MAKE NO GAS TEST
12FK6	12.6	4300-6520	0	30	SH	S1	400	‡Dual Diode
12FM6	12.6	4300-7021	0	25	SH	S1	650	TRIODE SECT. MAKE NO GAS TEST.
12FM6	12.6	4300-6520	0	36	SH	S1	400	‡Dual Diode
12FQ8	12.6	4572-8390	10	—	X2	S5	250	‡DUAL TEST TRIODE No. 1, PLATE No. TRIODE No. 2, PLATE No.
12FQ8	12.6	4572-8190	10	—	X2	S5	250	‡DUAL TEST TRIODE No. 1, PLATE No. TRIODE No. 2, PLATE No.
12FX5	12.6	4320-7610	15	—	X10	S5	475	
12G11‡	12.6	1C80-BA90	39	—	X4	S5	650	Pent. No. 1
12G11	12.8	1C30-6724	20	—	X2	S5	150	Pent. No. 2
12GC6	12.6	2750-0430	50	—	X10	S5	300	Cap—P
12GE5‡	12.6	1CB0-72A0	50	—	X10	S5	300	
12GJ5‡	12.6	4560-0730	31	—	X10	—	450	CAP—P, HOLD DOWN 51 AND PRESS 36 USE ADAPTER 53-4, 1000-
Model 752A:		No Adapter Required.						
12GN7	12.6	4520-7819	10	—	X20	S5	600	
12GT5	12.6	4560-9730	31	—	X10	—	450	HOLD DOWN 51 AND PRESS 36 USE ADAPTER 53-4, 1000-144
Model 752A:		No Adapter Required.						
12GV5‡	12.6	1C90-08A0	48	—	X10	S5	350	Cap—P
12GW6	12.8	2750-0480	31	—	X10	—	450	CAP—P, HOLD DOWN 51 AND PRESS 36
12H-B25	12.6	4520-0798	45	—	X10	S5	350	CAP—P USE ADAPTER 53-4, 1000-
12HE7‡	12.6	1C90-5880	58	—	X10	S5	200	Pent. Sect.
12HE7	12.6	1C00-2040	0	85	SH	S1	600	Diode Sect.
12HG7	12.6	4520-7813	11	—	X20	S5	550	
12HL5	12.6	4520-7930	21	—	X10	S5	625	
12HL7	12.6	4520-7813	18	—	X10	S5	450	
12JB6‡	12.6	4520-0138	31	—	X10	—	450	CAP—P, HOLD DOWN 51 AND PRESS 36 USE ADAPTER 53-4, 1000-14
Model 752A:		No Adapter Required.						CAP—P, HOLD DOWN 51 AND PRESS 36
12JF5‡	12.6	1C30-0240	36	—	X10	—	300	
12JN6‡	12.6	1CB0-7324	48	—	X10	S5	350	
12JN8	12.6	4590-6780	12	—	X10	S5	375	Pent. Sect.
12JN8	12.6	4510-2030	20	—	X10	S5	450	Triode Sect.
12JQ6	12.6	4570-1396	55	—	X4	S5	600	Pent. Sect.
12JQ6	12.6	4500-6090	0	70	SH	S1	400	Diode Sect.
12JS6‡	12.6	1C50-0324	68	—	X4	S5	600	Cap—P
12JT6‡	12.6	4520-9736	47	—	X10	S5	275	USE ADAPTER 53-4, 1000-144
Model 752A:		No Adapter Required.						
12K5	12.6	4320-7510	10	—	X4	S4	625	MAKE NO GAS TEST
12MD8‡	12.6	4568-3270	27	—	X4	S5	575	TRIODE NO. 1 & NO. 2 ‡ USE ADAPTER 53-4, 1000-144
12MD8	12.6	4590-1070	27	—	X4	S5	575	Triode No. 3
Model 752A:		No Adapter Required.						
12MN8‡	12.6	1C80-6030	21	—	X4	S5	650	Triode No. 1
12MN8	12.6	1CA8-4230	21	—	X4	S5	650	‡Dual Triode
12R-LL5	12.6	4572-6138	23	—	X4	S5	400	‡Dual Triode
12SN7	12.6	7841-6263	23	—	X4	S5	400	‡Dual Triode
12T10‡	12.6	1C80-BA90	20	—	X10	S5	375	Pent. No. 1
12T10	12.6	1C30-7625	15	—	X2	S5	200	Pent. No. 2
12V6	12.6	7250-3480	18	—	X4	S5	575	
12W6	12.6	7250-3480	25	—	X10	—	375	HOLD DOWN 51 AND PRESS 36
12X4	12.6	4300-6170	0	18	SH	S3	650	‡Dual Diode
13CW4‡	12.6	3140-2080	10	—	X10	S4	575	USE ADAPTER 53-4, 1000-13
Model 752A:								
13CW4	12.6	AC40-2080	10	—	X10	S4	575	
13DE7	12.6	4570-6080	20	—	X2	S5	625	Triode No. 1
13DE7	12.6	4520-1090	55	—	X4	S5	775	Triode No. 2

TUBE TYPE	FIL.	SELECTORS	BIAS	SHUNT	MULT	PRESS	MINIMUM MUT COND	NOTATIONS
21LR8‡	20.0	4520-6730	40	—	X10	S5	350	PENT. SECT. USE ADAPTER SA-4, [illegible]
21LR8	20.0	4590-8010	21	—	X4	S6	350	Triode Sect.
Model 752A:		No Adapter Required.						
21LU8‡	20.0	1C60-4890	40	—	X10	S5	350	Pent. Sect.
21LU8	20.0	1CA0-20B0	21	—	X4	S5	350	Triode Sect.
21MY8‡	20.0	1C60-4890	40	—	X10	S5	350	Pent. Sect.
21MY8	20.0	1CA0-20B0	21	—	X4	S6	350	Triode Sect.
22BH3‡	20.0	4500-2090	0	52	SH	S3	650	SET "LINE ADJUST" TO 100 ON 100 SCALE USE ADAPTER SA-4, [illegible]
Model 752A:		No Adapter Required.						
22BW3‡	25.0	1C00-A070	0	49	SH	S3	650	
22DE4	25.0	7800-5030	0	49	SH	S3	650	
22JF6‡	20.0	4520-0738	36	—	X10	—	550	CAP-P. HOLD DOWN S1 AND PRESS S5 USE ADAPTER SA-4, [illegible]
Model 752A:		No Adapter Required.						
22JG6‡	20.0	4520-9736	36	—	X10	—	550	HOLD DOWN S1 AND PRESS S5 USE ADAPTER SA-4, [illegible]
Model 752A:		No Adapter Required.						
22JR6‡	20.0	4520-9136	79	—	X2	S5	575	USE ADAPTER SA-4, [illegible]
Model 752A:		No Adapter Required.						
22JU6‡	20.0	4520-0736	79	—	X2	S5	575	CAP-P. USE ADAPTER SA-4, [illegible]
Model 752A:		No Adapter Required.						
22KM6‡	20.0	4520-0738	72	—	X4	S5	350	CAP-P. USE ADAPTER SA-4, [illegible]
Model 752A:		No Adapter Required.						
22KV6‡	20.0	4520-9736	65	—	X4	S6	760	USE ADAPTER SA-4, [illegible]
Model 752A:		No Adapter Required.						
23JS6‡	25.0	1C50-0324	68	—	X4	S5	600	Cap-P
23Z9‡	25.0	1C80-5970	40	—	X10	S5	300	Pent. Sect.
23Z9	25.0	1CA0-B070	20	—	X4	S5	550	Triode No. 1
23Z9	25.0	1C30-2070	30	—	X4	S5	360	Triode No. 2
24BF11‡	25.0	1C90-BA90	30	—	X10	S5	450	Pent. No. 1
24BF11	25.0	1C30-7625	19	—	X2	S5	275	Pent. No. 2
24GA7‡	25.0	1C40-7350	49	—	X4	S5	700	Pent. Sect.
24GA7	25.0	1C00-B080	0	43	SH	S3	400	Diode Sect.
24JE6A‡	25.0	4520-0738	42	—	X10	—	575	CAP-P. HOLD DOWN S1 AND PRESS S5 USE ADAPTER SA-4, [illegible]
Model 752A:		No Adapter Required.						
24JZ8‡	25.0	1C70-4890	40	—	X10	S5	425	Pent. Sect.
24JZ8	25.0	1CA0-20B0	34	—	X2	S5	500	Triode Sect.
24LQ6‡	25.0	4520-0738	42	—	X10	—	575	CAP-P. HOLD DOWN S1 AND PRESS S5 USE ADAPTER SA-4, [illegible]
Model 752A:		No Adapter Required.						
25AV5	25.0	7210-5830	28	—	X10	S4	350	
25AX4	25.0	7800-5030	0	40	SH	S3	650	
25BK5	25.0	4530-1860	0	—	X10	S5	475	
25BQ6	25.0	7250-0480	28	—	X10	S4	350	Cap-P HOLD DOWN S1 AND PRESS S5
25C5	25.0	4320-7610	13	—	X10	—	475	
25CA5	25.0	3420-7610	0	—	X10	S5	425	
25CD6	25.0	7250-0830	29	—	X10	S4	375	Cap-P
25CG3‡	25.0	1C00-4070	0	78	SH	S3	400	
25CK3‡	25.0	4500-2090	0	83	SH	S1	650	USE ADAPTER SA-4, [illegible]
Model 752A:		No Adapter Required.						
25CM3‡	25.0	4500-2790	0	64	SH	S3	650	SHUNT ON 4, USE ADAPTER SA-4, [illegible]
Model 752A:		No Adapter Required.						

TUBE TYPE	FIL.	SELECTORS	BIAS	SHUNT	MULT	PRESS	MINIMUM MUT COND	NOTATIONS
25CT3	25.0	4500-2090	0	45	SH	S3	750	
25DN6	25.0	7250-0830	28	—	X10	—	550	CAP-P. HOLD DOWN S1 AND PRESS S5
25EC6	25.0	7250-0830	69	—	X4	S5	625	Cap-P
25EH5	25.0	4320-7610	13	—	X10	S5	450	
25F5	25.0	4320-7610	30	—	X4	S5	625	
25F5A	25.0	4320-7610	30	—	X4	S5	700	
25H-B25	25.0	4620-0798	45	—	X10	S5	360	CAP-P USE ADAPTER SA-4, [illegible]
25HX5	25.0	4570-9630	55	—	X10	S5	350	USE ADAPTER SA-4, [illegible]
25JQ6	25.0	4570-1396	55	—	X4	S5	600	Pent. Sect.
25JQ6	25.0	4500-6090	0	70	SH	S1	400	Diode Sect.
25JZ8‡	25.0	1C70-4890	40	—	X10	S5	425	Pent. Sect.
25JZ8	25.0	1CA0-20B0	34	—	X2	S5	500	Triode Sect.
25L6	25.0	7250-3481	25	—	X10	—	375	HOLD DOWN S1 AND PRESS S5
25W4	25.0	7800-5030	0	60	SH	S3	650	
26DQ5	25.0	7210-0430	65	—	X4	S5	450	Cap-P
26HU5	25.0	8710-0320	75	—	X4	S5	900	Cap-P
26LW6	25.0	8750-0320	70	—	X10	S5	475	Cap-P
26LX6‡	25.0	1C50-0324	75	—	X4	S5	900	Cap-P
27LF6‡	25.0	1C50-0324	77	—	X4	S5	750	Cap-P
28D7	25.0	8170-5362	9	—	X4	S4	525	Pent. No. 1
28D7	25.0	8120-4367	9	—	X4	S4	525	Pent. No. 2
28HA6	25.0	4520-7613	11	—	X20	S5	400	
28HD8‡	25.0	1CB0-79A0	52	—	X10	S6	400	
29GK6	25.0	4520-7813	10	—	X10	S5	575	
29LE6	25.0	4580-0392	30	—	X10	S4	750	CAP-P USE ADAPTER SA-4, [illegible]
30AG11‡	35.0	1C85-7694	11	—	X10	S5	525	‡DUAL TRIODE. SET "LINE ADJUST" TO 100 ON 100 SCALE
30AG11	35.0	1C00-A3B2	0	76	SH	S1	400	‡Dual Diode
30HJ5‡	25.0	1CB0-792A	53	—	X10	S5	350	
30JZ6‡	35.0	1C50-0324	63	—	X10	—	300	Cap-P
30KD6‡	35.0	1C50-0324	75	—	X4	S5	750	CAP-P. SET "LINE ADJUST" TO 41 ON 0-100 SCALE
30MB6‡	35.0	1C50-0324	75	—	X4	S5	750	CAP-P. SET "LINE ADJUST" AT 41 ON 0 TO 100 SCALE
30M-P27	25.0	4320-7610	52	—	X4	S5	825	
30R-K47	25.0	4500-9020	0	56	SH	S3	800	CONNECT CAP TO PIN 1 OF OCTAL SOCKET
31AL10‡	35.0	1C80-4570	37	—	X4	S5	790	Pent. Sect.
31AL10	35.0	1CB0-90A0	15	—	X4	S5	750	Triode No. 1
31AL10	35.0	1C30-2070	28	—	X4	S5	472	Triode No. 2
31JS6A‡	35.0	1C50-0324	68	—	X4	S5	600	Cap-P
31LQ6‡	35.0	4520-0738	42	—	X10	—	575	CAP-P. HOLD DOWN S1 AND PRESS S5 USE ADAPTER SA-4, [illegible]
Model 752A:		No Adapter Required.						
32ET5	35.0	4320-7610	38	—	X4	S5	650	SET LINE ADJUST TO 100 ON 100 SCALE
32GA7‡	35.0	1C40-7350	49	—	X4	S5	700	Pent. Sect.
32GA7	35.0	1C00-B080	0	43	SH	S3	400	Diode Sect.
32HQ7‡	35.0	1C90-5B80	73	—	X10	S5	275	Pent. Sect.
32HQ7	35.0	1C00-2040	0	78	SH	S1	750	Diode Sect.
33GT7‡	35.0	1CB0-5A80	34	—	X10	—	450	PENT. SECT. HOLD DOWN S1 AND PRESS S3
33GT7	35.0	1C00-2040	0	76	SH	S3	400	Diode Sect.
33GY7‡	35.0	1CA0-5B80	34	—	X10	—	450	PENT. SECT. HOLD DOWN

TUBE TYPE	FIL.	SELECTORS	BIAS	SHUNT	MULT	PRESS	MINIMUM MUT COND	NOTATIONS

TUBE TYPE	FIL.	SELECTORS	BIAS	SHUNT	MULT.	PRESS.	MINIMUM MUT. COND.	NOTATIONS
33HE7‡	35.0	1C90-5B80	58	....	X10	S5	200	Pent. Sect.
33HE7	35.0	1C00-2040	0	65	SH	S3	500	Diode Sect.
33JR6‡	35.0	4520-9136	79	....	X2	S5	575	USE ADAPTER [illegible]
Model 752A:		No Adapter Required.						
33JV6‡	35.0	1C80-732A	60	....	X10	S5	325	
34CD3‡	35.0	1C00-A070	0	63	SH	S3	650	
34CE3‡	35.0	1C00-4070	0	65	SH	S3	650	
34GD5	35.0	3420-7610	39	....	X4	S5	700	
34CM3‡	35.0	4500-2790	0	64	SH	S3	650	SHORT PIN 1, USE ADAPTER [illegible]
Model 752A:		No Adapter Required.						
35B5	35.0	4310-5620	0	....	X10	S4	300	
35C5	35.0	4320-7610	0	....	X10	S4	300	
35EH5	35.0	4320-7610	15	....	X10	S5	450	
35GL6	35.0	4320-7610	35	....	X10	S5	325	
35HB8	35.0	4590-7680	24	....	X4	S5	475	Pent. Sect.
35HB8	35.0	4510-3020	15	....	X4	S5	475	Triode Sect.
35L6	35.0	7250-3480	0	....	X10	S4	300	
35LR6‡	35.0	1C50-0324	80	....	X4	S5	2500	Cap-P
35W4	35.0	4300-5070	0	50	SH	S3	650	
35Z5	35.0	7200-5080	0	50	SH	S3	650	
36AM3	35.0	4300-5070	0	49	SH	S3	650	
36KD6‡	35.0	1C50-0324	75	....	X4	S5	900	Cap-P
36MC6‡	35.0	4520-0738	75	....	X4	S5	900	Cap-P, USE ADAPTER [illegible]
Model 752A:		No Adapter Required.						
38HE7‡	50.0	1C90-5B80	61	....	X10	S5	200	PENT. SECT. SET "LINE ADJUST" TO MIN ON 100 SCALE
38HE7	50.0	1C00-2040	0	82	SH	S1	500	Diode Sect.
38HK7‡	35.0	1C90-5B80	60	....	X4	S5	625	Pent. Sect.
38HK7	35.0	1C00-2040	0	88	SH	S1	400	Diode Sect.
40FR5	35.0	3420-7610	40	....	X4	S5	600	
40KD6‡	35.0	1C50-0324	75	....	X4	S5	900	Cap-P
42EC4	50.0	4500-7000	0	66	SH	S3	350	USE ADAPTER [illegible], CONNECT CAP TO EXT. SELF BIAS RES. JACKS (MODEL 752A—CAP-G, CAP-P), SET "LINE ADJUST" AT MIN ON 200 SCALE
Model 752A:								
42KN6‡	50.0	1C50-0324	64	....	X10	S5	300	
50BM8	50.0	4530-6720	26	....	X4	S5	625	Pent. Sect.
50BM8	50.0	4510-9080	0	....	X2	S5	775	Triode Sect.
50C5	50.0	4320-7610	13	....	X10	....	475	HOLD DOWN S1 AND PRESS S3
50DC4	50.0	4300-5070	0	54	SH	S3	650	
50EH5	50.0	4320-7610	13	....	X10	S5	650	
50FE5	50.0	7250-3480	30	....	X10	S5	400	
50FK5	50.0	4320-7610	21	....	X4	S5	750	
50GY7‡	50.0	1CA0-5B80	34	....	X10	....	450	PENT. SECT. HOLD DOWN S1 AND PRESS S3
50GY7	50.0	1C00-2040	0	76	SH	S3	400	Diode Sect.
50HC6	50.0	3420-7510	13	....	X10	S5	650	
50HK6	50.0	4320-7510	13	....	X10	....	475	HOLD DOWN S3 AND PRESS S5
50HN5	50.0	4520-7930	21	....	X10	S5	625	
53HK7‡	50.0	1C90-5B80	60	....	X4	S5	625	Pent. Sect.
53HK7	50.0	1C00-2040	0	88	SH	S1	400	Diode Sect.
58HE7‡	50.0	1C90-5B80	58	....	X10	S5	200	Pent. Sect.
58HE7	50.0	1C00-2040	0	85	SH	S1	500	Diode Sect.

TUBE TYPE	FIL.	SELECTORS	BIAS	SHUNT	MULT.	PRESS.	MINIMUM MUT. COND.	NOTATIONS
60FX5	50.0	4320-7610	15	....	X10	S5	475	
60HL5	50.0	4520-7930	28	....	X20	S5	400	SET "LINE ADJUST" TO MIN ON 100 SCALE
KT66	6.3	7250-3481	20	....	X10	S5	400	
80	5.0	4100-3000	0	36	SH	S3	400	Plate No. 1
80	5.0	4100-2000	0	27	SH	S3	400	Plate No. 2
83	5.0	4100-3000	0	60	SH	S3	650	Plate No. 1
83	5.0	4100-2000	0	57	SH	S3	650	Plate No. 2
85A1	See 0E3—Top of Chart							
85A2	See 0G3—Top of Chart							
ECC88	6.3	4572-6183	20	....	X10	S5	775	‡Dual Triode
KT88	6.3	7250-3481	13	....	X20	S5	225	
90C1	OFF	0000-5070	....	....	VR	†S9	90V	★ 140V. REGULATION=14 VOLTS FROM 1 TO 40 MA. ★140 V. REGULATION=5 VOLTS FROM 1 TO 15 MA.
150B2	OFF	0000-1020	....	....	VR	†S9	150V	
274A	5.0	1400-2000	0	60	SH	S3	400	Plate No. 1
274A	5.0	1400-3000	0	40	SH	S3	400	Plate No. 2
286A	2.0	1600-2354	30	....	X2	S5	200	Cap-G
CAA322	6.3	7200-5000	0	58	SH	S3	400	USE NICKOR ADAPTER CODE NO. [illegible]
328A	7.5	1600-2354	18	....	X2	S5	575	Cap-G
349A	6.3	2750-3480	10	....	X4	S5	575	
446A	OFF	0000-6710	....	....	VR	†S9	81V	★87V. REGULATION=1.3 V FROM 0 TO 40 MA. RIGHT CAP=P USE NICKOR ADAPTER [illegible] CODE NO. [illegible]
829B	6.3	5762-0340	15	....	X10	S5	475	
829B	6.3	5126-0340	15	....	X10	S5	475	Left Cap=P
832A	6.3	5762-0340	28	....	X4	S5	650	RIGHT CAP=P USE NICKOR ADAPTER [illegible] CODE NO. [illegible]
832A	6.3	5126-0340	28	....	X4	S5	650	Left Cap=P
836	4.3	4100-0000	0	55	SH	S3	650	Cap=P
866A	4.3	4100-0000	0	50	SH	S3	650	Cap=P
874	OFF	0000-3010	....	....	VR	†S9	90V	★110 V. REGULATION=7 VOLTS FROM 10 TO 30 MA.
884	6.3	7250-3080	#	93	SH	S6	650	STRIKES AT ABOUT 75
885	2.5	5130-2040	#	93	SH	S6	650	STRIKES AT ABOUT 75
991	OFF	0000-3060	....	....	VR	†S9	53V	USE NICKOR ADAPTER CODE No. [illegible] ★57 V. MAX. REGULATION=1 VOLTS MAX. FROM 0.4 TO 2.5 MA. TUBE DROP MAX.=60 V. TUBE DROP MAX.=57 V.
991	OFF	0000-6030	....	....	VR	†S9	53V	★57 V. MAX. REGULATION=1 VOLTS MAX. FROM 0.4 TO 2.5 MA. TUBE DROP MAX.=60 V. TUBE DROP MAX.=57 V.
1217	6.3	4370-5621	0	....	X2	....	475	AMPL. SECT. HOLD DOWN S1 AND PRESS S5
1217	6.3	4310-5627	0	....	X2	S5	475	Osc. Sect.
1218A	6.3	3460-7050	12	....	X10	S5	750	
1222	6.3	6140-2378	17	....	X10	S5	300	
1655	6.3	7843-5260	12	....	X4	S5	200	‡Dual Triode
2050	6.3	7250-3086	#	93	SH	S6	650	STRIKES AT ABOUT 70
2051	6.3	7250-3086	#	93	SH	S6	650	STRIKES AT ABOUT 70
4604	6.3	2750-0300	45	....	X4	S5	500	Cap=P
5636	6.3	3610-5724	11	....	X4	S5	300	
5642	1.1	1200-0000	0	....	X1	S3	400	TOP=P, CONNECT FIL. LEADS TO PINS 1 AND 2

TUBE TYPE	FIL	SELECTORS	BIAS	SHUNT	MULT	PRESS	MINIMUM MUT COND	NOTATIONS
5643	6.3	3670-1052	#	50	SH	S3	650	STRIKES AT ABOUT 70
5644	OFF	0000-1020	....	....	VR	†S9	95V	†120 V. REGULATION-6 VOLTS FROM 1 TO 30 MA.
5651	OFF	0000-1070	....	....	VR	†S9	87V	†90 V. REGULATION-5 VOLTS FROM 1.5 TO 1.5 MA.
5654	6.3	4310-5620	10	....	X4	S5	675	
5655	6.3	4523-8197	11	....	X10	S5	375	Tetrode No. 1
5656	6.3	4532-7198	11	....	X10	S5	375	Tetrode No. 2
5670	6.3	9173-6482	16	....	X10	S5	300	†Dual Triode
5672	1.1	3540-1200	27	....	X1	S5	300	
5675	6.3	2730-5060	18	....	X10	S5	400	USE NICKOR ADAPTER SA-4 CODE NO. 1400-121
5676	1.1	4230-1000	26	....	X2	S5	500	
5677	1.1	4230-1000	38	....	X2	S5	200	
5678	1.1	3540-1200	8	....	X1	S5	525	
5686	6.3	4520-7630	10	....	X4	S5	475	
5687	12.6	4572-9163	28	....	X10	S5	475	†Dual Triode
5696	6.3	4310-6025	#	94	SH	S6	650	STRIKES AT ABOUT 21
5702	6.3	3470-1265	10	....	X4	S5	675	
5703	6.3	3450-1060	22	....	X10	S5	300	
5704	6.3	2300-1040	0	80	SH	S1	400	
5718	6.3	3610-8057	10	....	X10	S4	350	
5719	6.3	3610-8057	10	....	X4	S5	350	
5725	6.3	4310-5627	0	....	X2	S5	550	
5726	6.3	4300-7215	0	78	SH	S1	400	†Dual Diode
5727	6.3	4310-6025	#	94	SH	S6	650	STRIKES AT ABOUT 21
5744	6.3	2340-1050	7	....	X10	S5	250	
5749	6.3	4310-5672	0	....	X4	S5	500	
5750	6.3	4370-5621	0	....	X2	....	250	AMPL. SECT. HOLD DOWN S1 AND PRESS S5
5750	6.3	4310-6027	20	....	X10	S5	400	Osc. Sect.
5751	12.6	4572-6183	14	....	X4	S5	200	†Dual Triode
5755	12.6	4563-8172	0	....	X4	S5	225	†Dual Triode
5763	6.3	4590-1673	0	....	X10	S5	425	
5783	OFF	0000-3050	....	....	VR	†S9	87V	†110 V. REGULATION —3 VOLTS FROM 1.5 TO 1.5 MA.
5784	6.3	3470-1265	16	....	X4	S5	275	
5787	OFF	0000-3050	....	....	VR	†S9	100V	†120 V. REGULATION —5 VOLTS FROM 1 TO 30 MA.
5812	*6.3	4310-5602	28	....	X4	S5	650	
5814	12.6	4572-6183	25	....	X2	S5	675	†Dual Triode
5824	25.0	7250-3480	20	....	X10	S4	300	
5825	1.4	4100-0000	0	0	SH	S6	250	Cap-P
5829	6.3	3500-6172	0	78	SH	S1	400	†Dual Diode
5840	6.3	3610-5740	16	....	X4	S5	475	
5842	6.3	3950-1060	19	....	X20	S5	375	
5844	6.3	4356-2170	24	....	X4	S5	525	†Dual Triode
5847	6.3	3910-6840	13	....	X20	S5	300	
5852	6.3	7200-5380	0	35	SH	S3	400	†Dual Diode
5876	6.3	2730-5060	11	....	X10	S5	325	USE NICKOR ADAPTER SA-4 CODE NO. 1400-121
5881	6.3	7250-3481	17	....	X10	S5	300	
5893	6.3	7230-5060	16	....	X10	S5	375	USE NICKOR ADAPTER SA-4 CODE NO. 1400-121
5894	12.6	1762-0340	35	....	X4	S5	625	RIGHT CAP-P USE NICKOR ADAPTER SA-4 CODE NO. 1400-121
5894	12.6	1726-0340	35	....	X4	S5	625	Left Cap-P
5896	6.3	3600-5172	0	40	SH	S3	650	†Dual Diode
5897	6.3	3610-8050	19	....	X10	S5	300	
5899	6.3	3610-5740	13	....	X4	S5	475	
5900	6.3	3610-5740	13	....	X4	S5	475	
5902	6.3	3610-5720	40	....	X4	S5	650	
5903	25.0	3600-5172	0	40	SH	S3	650	†Dual Diode
5904	25.0	3610-8050	20	....	X4	S4	475	
5905	25.0	3610-5720	30	....	X2	S5	500	
5906	25.0	3610-5720	13	....	X4	S5	475	
5907	25.0	3610-5720	15	....	X4	S4	350	
5908	25.0	3610-6724	8	....	X4	S4	275	
5915A	6.3	4370-5621	0	....	X2	....	475	AMPL. SECT. HOLD DOWN S1 AND PRESS S5
5915A	6.3	4310-5627	0	....	X2	S5	475	Osc. Sect.
5916	25.0	3610-5724	20	....	X4	S5	250	Grid No. 1
5916	25.0	3640-5721	20	....	X2	....	225	GRID NO. 1 HOLD DOWN S1 AND PRESS S5
5930	2.5	4130-2000	74	....	X4	S5	475	
5931	5.0	8200-6000	0	35	SH	S3	650	Plate No. 1
5931	5.0	8200-4000	0	30	SH	S3	650	Plate No. 2
5932	6.3	7250-3481	17	....	X10	S5	300	
5933	6.3	5130-0240	28	....	X4	S6	500	Cap-P
5961	6.3	7250-3468	Use This Setting For Short Check Only.					
5961	6.3	7250-4068	30	....	X4	S5	625	DO NOT CHECK FOR SHORTS.
5963	12.6	4572-6183	17	....	X4	S5	425	†Dual Triode
5964	6.3	4356-2170	21	....	X4	S5	625	†Dual Triode
5965	12.6	4572-6183	15	....	X10	S5	400	†Dual Triode
5971	1.1	5320-1000	20	....	X4	S5	225	
5975	6.3	4530-1020	29	....	X4	S5	625	
5977	6.3	3610-8053	30	....	X4	S5	625	
5987	6.3	3610-2050	39	....	X2	S4	575	
5993	6.3	3700-9150	0	30	SH	S3	650	†Dual Diode
5995	6.3	4300-1050	0	30	SH	S3	650	Leads 1-3-4-5
5998	7.5	7841-5263	37	....	X20	S4	425	†Dual Triode
6005	6.3	4310-5620	18	....	X4	S5	575	
6012	6.3	7230-5018	#	93	SH	S6	650	STRIKES AT ABOUT 80
6021	6.3	3672-8154	15	....	X10	S5	325	†Dual Triode
6028	20.0	4310-5620	10	....	X4	S5	675	
6046	25.0	7250-3481	25	....	X10	....	375	HOLD DOWN S1 AND PRESS S5
6050	1.1	4230-1000	32	....	X4	S5	200	
6051	1.1	3540-1200	39	....	X1	S4	350	
6052	6.3	3600-5172	0	40	SH	S3	650	†Dual Diode
6053	25.0	3600-5172	0	40	SH	S3	650	†Dual Diode
6055	25.0	3610-8050	20	....	X4	S4	475	
6056	25.0	3610-5720	15	....	X4	S4	350	
6058	6.3	4300-7215	0	78	SH	S1	400	†Dual Diode
6064	6.3	3410-5726	11	....	X10	S5	300	
6072	12.6	4572-6183	15	....	X4	S5	275	†Dual Triode

TUBE TYPE	FIL	SELECTORS	BIAS	SHUNT	MULT	PRESS	MINIMUM MUT COND	NOTATIONS
6073	OFF	0000–5020	....	....	VR	†S9	150V	*105 V. REGULATION=2 VOLTS FROM 5 TO 30 MA.
6074	OFF	0000–5020	....	....	VR	†S9	108V	*108 V. REGULATION=1 VOLT FROM 5 TO 30 MA.
6080	7.5	7841–5263	55	....	X4	S4	625	‡Dual Triode
6082	25.0	7841–5263	55	....	X4	S4	625	‡Dual Triode
6084	6.3	4590–6138	15	....	X2	S5	575	
6085	12.6	4572–6183	17	....	X4	S5	425	‡Dual Triode
6086	20.0	4520–6139	10	....	X10	S5	550	
6096	6.3	4310–5620	10	....	X4	S5	675	
6097	6.3	4300–7215	0	78	SH	S1	400	‡Dual Diode
6098	6.3	6870–3510	17	....	X10	S5	325	
6110	6.3	3600–6172	0	70	SH	S1	400	‡Dual Diode
6111	6.3	3672–8154	8	....	X10	S4	300	‡Dual Triode
6112	6.3	3672–8154	15	....	X4	S5	400	‡Dual Triode
6134	6.3	7240–8653	13	....	X10	S5	375	
6135	6.3	4360–1070	25	....	X2	S5	675	
6136	6.3	4310–5672	10	....	X4	S5	475	
6137	6.3	7240–8653	10	....	X4	S5	300	
6146	6.3	7250–0318	12	....	X10	S4	425	Cap=P
6148	6.3	3470–1265	10	....	X4	S5	675	
6152	6.3	4530–1020	29	....	X4	S5	625	
6159	25.0	7250–0318	12	....	X10	S4	425	Cap=P
6173	6.3	2700–5060	0	78	SH	S1	400	USE HICKOK ADAPTER 6A-8 CODE NO. 1000-121
6186	6.3	4310–5620	10	....	X4	S5	625	
6189	12.6	4572–6183	25	....	X2	S5	675	‡Dual Triode
6197	6.3	4520–6317	12	....	X10	S5	475	
6201	12.6	4572–6183	14	....	X4	S5	625	‡Dual Triode
6202	6.3	4300–6170	0	0	SH	S3	650	‡Dual Diode
6203	6.3	4500–9170	0	18	SH	S3	650	‡Dual Diode
6205	6.3	3610–5724	16	....	X4	S5	475	
6206	6.3	3610–5724	13	....	X4	S5	475	
6211	12.6	4572–6183	23	....	X4	S5	550	‡Dual Triode
6213	OFF	0000–3050	....	....	VR	†S9	130V	*117 V. REGULATION=8 VOLTS FROM 5 TO 25 MA.
6216	6.3	4520–1730	0	....	X10	S4	550	
6221	6.3	3610–8050	20	....	X10	S5	525	
6222	6.3	3610–8050	21	....	X2	S5	275	
6223	6.3	3610–5780	16	....	X4	S5	475	
6225	6.3	3610–5720	16	....	X4	S5	475	
6245	6.3	3470–1265	10	....	X4	S5	675	
6247	6.3	3620–8050	11	....	X4	S5	300	
6263	6.3	7230–5060	16	....	X10	S5	450	USE HICKOK ADAPTER 6A-8 CODE NO. 1000-121
6264	6.3	7230–5060	16	....	X10	S5	450	USE HICKOK ADAPTER 6A-8 CODE NO. 1000-121
6265	6.3	4310–5627	10	....	X4	S5	425	
R6279	6.3	7200–0080	0	30	SH	S3	650	Top Washer=P
6286	1.4	4230–1000	22	....	X2	S4	525	
6293	6.3	7250–0310	0	....	X10	S4	400	Cap=P
6308	OFF	0000–3010	....	....	VR	†S9	87V	*115 V. REGULATION=2 VOLTS FROM 15 TO 25 MA.
6332	OFF	0000–1020	....	....	VR	†S9	63V	*108 V. REGULATION=2 VOLTS FROM 0.1 TO 1.0 MA. LEADS IN PIN POS. 1-2.
6350	12.6	4583–6172	27	....	X10	S5	275	‡Dual Triode
6354	OFF	0000–1020	....	....	VR	†S9	150V	*108 V. REGULATION=5 VOLTS FROM 5 TO 15 MA.
6360	12.6	4531–8720	13	....	X4	S5	500	Tetrode No. 1
6360	12.6	4513–6720	13	....	X4	S5	500	Tetrode No. 2
6384	6.3	6870–3510	17	....	X10	S5	325	
6386	6.3	9173–6482	23	....	X4	S5	625	‡Dual Triode
6397	2.5	7180–3600	29	....	X2	S5	600	
6414	12.6	4572–6183	15	....	X10	S5	350	‡Dual Triode
6417	12.6	4590–1673	0	....	X10	S5	425	
6418	1.4	3500–2041	0	0	SH	S1	175	MAKE NO GAS TEST
6463	12.6	4583–6172	24	....	X10	S5	300	‡Dual Triode
6485	6.3	4310–5672	13	....	X10	S5	375	
6519	1.4	3540–1200	20	....	X1	S5	350	MAKE NO GAS TEST
6520	7.5	7841–5263	55	....	X4	S4	625	‡Dual Triode
6524	6.3	5362–0740	15	....	X4	S5	700	CAP OVER METAL PINS 3-5=P
6524	6.3	5326–0140	15	....	X4	S5	700	CAP OVER OCTAL PINS 8-7=P
	Use Hickok Adapter Code No. 1050–107							
6526	1.1	3540–1200	35	....	X2	S5	800	
6533	6.3	6720–1050	21	....	X2	S5	300	
6540	6.3	3470–1265	10	....	X4	S5	675	
6542	OFF	0000–3050	....	....	VR	†S9	150V	*105 V. REGULATION=8 VOLTS FROM 5 TO 25 MA. LEADS—1,2,5. DEFLECTION LEADS—K
6611	1.4	3500–2041	0	0	SH	S1	300	MAKE NO GAS TEST
6612	1.4	3500–2041	0	45	SH	S1	400	MAKE NO GAS TEST
6626	OFF	0000–5020	....	....	VR	†S9	150V	*100 V. REGULATION=2 VOLTS FROM 5 TO 30 MA.
6627	OFF	0000–5020	....	....	VR	†S9	108V	*114 V. REGULATION=1.5 V. FROM 5 TO 30 MA.
6659	OFF	0000–1050	0	0	SH	S2	650	
6660	6.3	4310–5672	0	....	X4	S5	500	
6661	6.3	4310–5627	10	....	X4	S5	425	
6662	6.3	4310–5627	10	....	X2	S5	775	
6663	6.3	4300–7215	0	78	SH	S1	400	‡Dual Diode
6664	6.3	4360–1070	14	....	X4	S5	625	
6669	6.3	4310–5620	18	....	X4	S5	575	
6676	6.3	4310–5627	10	....	X4	S5	700	
6677	6.3	4520–6317	12	....	X10	S5	475	
6678	6.3	4520–6370	12	....	X4	S5	475	Pent. Sect.
6678	6.3	4590–1080	10	....	X10	S5	525	Triode Sect.
6679	12.6	4572–6183	14	....	X4	S5	625	‡Dual Triode
6680	12.6	4572–6183	25	....	X2	S5	675	‡Dual Triode
6681	12.6	4572–6183	14	....	X4	S5	200	‡Dual Triode
6688	6.3	4520–7916	8	....	X10	S5	600	
6690	6.3	3672–5184	13	....	X10	S5	300	‡Dual Triode
6754	6.3	4500–9173	0	45	SH	S3	650	‡Dual Diode
6761	6.3	4520–1730	31	....	X10	S5	475	
6788	6.3	3610–5720	17	....	X2	S5	250	

TUBE TYPE	FIL.	SELECTORS	BIAS	SHUNT	MULT	PRESS	MINIMUM MUT COND	NOTATIONS
6814	6.3	3610–8050	24	—	X4	S5	650	
6829	12.6	4572–6183	15	—	X10	S5	425	‡Dual Triode
6832	6.3	3672–8154	27	—	X2	S5	325	‡Dual Triode
6850	12.6	5362–0740	15	—	X4	S5	700	CAP OVER OCTAL PINS 1-5-6
6850	12.6	5325–0140	15	—	X4	S5	700	CAP OVER OCTAL PINS 4-7-8
	Use Hickok Adapter Code No. 1050–107							
6872	6.3	3470–1265	17	—	X2	S5	700	
6883	12.6	7250–0318	12	—	X10	S4	425	Cap–P
6887	6.3	4300–7215	0	78	SH	S1	400	‡Dual Diode
6889	6.3	6870–0510	17	—	X10	S5	325	Cap–P
6900	12.6	4572–9163	28	—	X10	S5	475	‡Dual Triode
6919	6.3	4300–7215	0	78	SH	S1	400	‡Dual Diode
6922	6.3	4572–6183	21	—	X10	S5	675	‡Dual Triode
6928	6.3	4310–5620	18	—	X4	S5	575	
6939	12.6	4531–8720	12	—	X10	S5	425	Tetrode No. 1
6939	12.6	4513–6720	12	—	X10	S5	425	Tetrode No. 2
6943	6.3	3610–5724	11	—	X4	S5	475	
6944	6.3	3610–5724	9	—	X4	S5	475	
6945	6.3	3610–5720	44	—	X4	S5	450	
6946	6.3	3610–8050	27	—	X4	S5	600	
6947	6.3	3672–8154	17	—	X4	S5	625	‡Dual Triode
6948	6.3	3672–8154	16	—	X4	S5	300	‡Dual Triode
6973	6.3	4530–9170	14	—	X10	S5	300	
7000	6.3	7200–3485	21	—	X2	S5	375	Cap–G
7025	12.6	4572–6183	14	—	X4	S5	200	‡Dual Triode
7027	6.3	7250–3180	17	—	X10	S5	300	
7036	6.3	4370–5621	0	—	X2	—	375	SIMPLE SECT. HOLD DOWN S1 AND PRESS S2
7036	6.3	4310–5627	0	—	X2	S5	375	Osc. Sect.
7044	12.6	4572–9163	28	—	X10	S5	475	‡Dual Triode
7054	12.6	4520–7813	0	—	X10	S5	500	
7055	12.6	4300–7215	0	78	SH	S1	400	‡Dual Diode
7056	12.6	4310–5627	10	—	X4	S5	700	
7057	12.6	4572–6183	17	—	X10	S5	425	‡Dual Triode
7058	12.6	4572–6183	14	—	X4	S5	200	‡Dual Triode
7059	12.6	4520–6370	12	—	X4	S5	475	Pent. Sect.
7059	12.6	4590–1080	10	—	X10	S5	525	Triode Sect.
7060	12.6	4580–6790	11	—	X4	S5	725	Pent. Sect.
7060	12.6	4520–1030	16	—	X4	S5	600	Triode Sect.
7061	12.6	4530–9170	18	—	X4	S5	575	
7119	12.6	5472–9163	17	—	X20	S5	500	‡Dual Triode
7137	6.3	4360–7020	15	—	X20	S5	350	
7167	12.6	4310–5620	12	—	X4	—	525	HOLD DOWN S1 AND PRESS S2
7189	6.3	5420–7930	12	—	X10	S5	575	
7199	6.3	4570–2360	7	—	X10	S5	375	Pent. Sect.
7199	6.3	4590–1080	29	—	X2	S5	650	Triode Sect.
7212	6.3	7250–0318	12	—	X10	S4	425	Cap–P
7233	6.3	4520–9080	29	—	X20	S4	550	
7236	7.5	7841–5263	40	—	X10	S4	550	‡Dual Triode
7239	6.3	4510–0697	30	—	X4	S5	350	Cap–P
7247	12.6	4570–6080	14	—	X4	S5	200	Triode No. 1
7247	12.6	4520–1030	25	—	X2	S5	675	Triode No. 2
7258	12.6	4580–6791	10	—	X10	S5	375	Pent. Sect.
7258	12.6	4520–1736	21	—	X4	S5	700	Triode Sect.
7308	6.3	4572–6183	21	—	X10	S5	675	‡Dual Triode
7316	12.6	4572–6183	25	—	X2	S5	675	‡Dual Triode
7355	6.3	7250–3850	10	—	X10	S5	475	
7357	25.0	7250–0318	12	—	X10	S4	425	Cap–P
7358	6.3	7250–0318	12	—	X10	S4	425	Cap–P
7360	6.3	4530–6219	16	—	X2	S5	650	CONNECT PIN 1 TO PIN 4 AND PIN 6 TO PIN 7 ON OCTAL SOCKET.
7370	20.0	5870–9060	28	—	X10	S5	475	Triode No. 1
7370	20.0	8420–1030	28	—	X4	S5	575	Triode No. 2
7408	6.3	7250–3481	18	—	X4	S5	475	
7543	6.3	4310–5672	10	—	X4	S5	475	
7551	12.6	4520–6317	23	—	X10	S5	375	
7558	6.3	4520–6317	23	—	X10	S5	375	
7581	6.3	2750–3480	17	—	X10	S5	375	
7585‡	6.3	3140–2080	13	—	X10	S4	600	USE ADAPTER SA-3, 1000-127
Model 752A:								
7586	6.3	AC40–2080	13	—	X10	S4	600	
7587‡	6.3	3140–0280	10	—	X10	—	450	CAP–P, HOLD DOWN S1 AND PRESS S2. USE ADAPTER SA-3, 1000-127
Model 752A:								CAP–P, HOLD DOWN S1 AND PRESS S2.
7587	6.3	AC40–0280	10	—	X10	—	450	
7591	6.3	7260–3450	10	—	X10	S5	500	
7683	6.3	4510–3820	10	—	X2	S5	500	
7687	6.3	4520–6370	10	—	X4	S5	550	Pent. Sect.
7687	6.3	4590–1080	28	—	X4	S5	425	Triode Sect.
7695	50.0	4560–9170	34	—	X10	S5	450	
7700	6.3	6100–2354	21	—	X2	S5	375	Cap–G
7701	12.6	5420–6910	11	—	X4	S5	550	
7716	12.6	4570–9860	12	—	X10	S5	425	Pent. Sect.
7716	12.6	4520–3010	12	—	X2	S5	575	Triode Sect.
7717	6.3	4310–5620	12	—	X4	—	625	HOLD DOWN S1 AND PRESS S2.
7719	12.6	5420–1030	30	—	X4	S5	450	
7724	12.6	4580–9070	10	—	X2	S5	250	Triode Sect.
7724	12.6	4600–2631	0	78	SH	S1	400	‡Dual Diode
7728	12.6	4572–6183	14	—	X4	S5	625	‡Dual Triode
7729	12.6	4572–6183	14	—	X4	S5	200	‡Dual Triode
7730	12.6	4572–6183	25	—	X2	S5	675	‡Dual Triode
7731	6.3	4520–6370	12	—	X4	S5	475	Pent. Sect.
7731	6.3	4590–1080	10	—	X10	S5	525	Triode Sect.
7732	6.3	4310–5627	10	—	X4	S5	700	
7733	12.6	4520–7813	0	—	X10	S5	500	
7734	6.3	4580–9170	15	—	X2	S5	650	Pent. Sect.
7734	6.3	4530–6020	68	—	X4	S5	550	Triode Sect.
7737	6.3	4520–7918	8	—	X10	S5	600	
7738	6.3	4320–1050	13	—	X10	S5	475	
7754	6.3	4560–9170	34	—	X10	S5	450	
7757	6.3	3560–0280	18	—	X4	S5	575	Cap–P
7759	25.0	3672–8154	15	—	X10	S5	325	‡Dual Triode
7760	25.0	3672–8154	20	—	X4	S4	475	‡Dual Triode
7761	25.0	3610–5720	15	—	X4	S5	450	

TUBE TYPE	FIL.	SELECTORS	BIAS	SHUNT	MULT.	PRESS.	MINIMUM MUT. COND.	NOTATIONS
7762	25.0	3610-6720	40	—	X4	S5	650	
7802	6.3	7841-5263	45	—	X20	S5	500	‡Dual Triode
7803	6.3	4572-6183	20	—	X10	S5	775	‡Dual Triode
7861	12.6	9173-6482	16	—	X10	S5	300	‡Dual Triode
7867	6.3	7250-0830	26	—	X10	—	525	CAP-P, HOLD S1 AND PRESS S5
7868‡	6.3	4560-9730	11	—	X10	S5	525	USE ADAPTER[illegible]
Model 752A:		No Adapter Required.						
7889	25.0	3672-8154	15	—	X4	S5	400	‡Dual Triode
7895‡	6.3	3140-2080	16	—	X10	S5	525	USE ADAPTER [illegible]
Model 752A:								
7895	6.3	AC40-2080	16	—	X10	S5	525	
7898	12.6	4572-6183	10	—	X10	S5	475	‡Dual Triode
7905	6.3	9120-6807	15	—	X10	S5	325	
7984‡	12.6	1CA0-3890	46	—	X10	S5	350	
7995	6.3	1430-7825	11	—	X10	S5	650	
8032	12.6	7250-0318	12	—	X10	S4	425	Cap-P
8056‡	6.3	3100-2084	0	70	SH	S1	650	MAKE NO BIAS TEST USE ADAPTER [illegible]
Model 752A:								
8056	6.3	AC00-2084	0	70	SH	S1	650	MAKE NO BIAS TEST
8058‡	6.3	1300-0020	13	—	X10	S5	625	CAP-P, [illegible] USE ADAPTER [illegible]
Model 752A:								
8058	6.3	AC00-0020	13	—	X10	S5	625	CAP-P, [illegible]
8064	25.0	6310-6780	17	—	X4	S5	400	
8068	6.3	2750-0830	18	—	X10	S5	325	Cap-P
8077	12.6	4520-7813	0	—	X10	S5	500	
8084	12.6	3410-5627	17	—	X10	S5	400	
8096	6.3	6720-1050	21	—	X2	S5	300	
8102	12.6	4590-6780	11	—	X4	S5	625	Pent. Sect.
8102	12.6	4530-1020	13	—	X10	S5	525	Triode Sect.
8106	12.6	4570-1890	14	—	X10	S5	500	
8113	6.3	4310-5670	22	—	X4	S5	550	
8136	6.3	4310-5627	10	—	X10	S5	400	
8149‡	12.6	1CA0-7890	50	—	X4	S5	700	
8150‡	12.6	1CA0-0860	50	—	X4	S5	700	Cap-P
8156‡	12.6	1CA0-3760	31	—	X4	S5	625	
8185	6.3	8120-3060	20	—	X20	S5	650	
8186	25.0	8120-3060	20	—	X20	S5	650	
8203‡	6.3	3140-2080	26	—	X10	S5	300	USE ADAPTER [illegible]
Model 752A:								
8203	6.3	AC40-2080	26	—	X10	S5	300	
8236	6.3	7210-0430	65	—	X4	S5	450	Cap-P
8298	6.3	7250-0318	12	—	X10	S4	425	Cap-P
8327	6.3	4520-7930	23	—	X10	S5	375	
8334	6.3	3460-7050	12	—	X10	S5	750	
8393‡	12.6	3140-2080	24	—	X10	S5	500	USE ADAPTER [illegible]
Model 752A:								
8393	12.6	AC40-2080	24	—	X10	S5	500	
8417	6.3	2750-3460	10	—	X20	S5	375	
8425	6.3	4310-5672	10	—	X10	S5	625	
8426	12.6	4310-5672	10	—	X10	S5	625	
8431	12.6	5472-6183	20	—	X20	S5	500	‡Dual Triode

TUBE TYPE	FIL.	SELECTORS	BIAS	SHUNT	MULT.	PRESS.	MINIMUM MUT. COND.	NOTATIONS
8445	6.3	4520-6370	10	—	X4	S5	750	Pent. Sect.
8445	6.3	4590-1080	28	—	X4	S5	600	Triode Sect.
8446	6.3	4590-6780	10	—	X10	S5	300	Pent. Sect.
8446	6.3	4510-2030	14	—	X10	S5	425	Triode Sect.
8489	6.3	4590-6790	11	—	X10	S5	360	Pent. Sect.
8489	6.3	4520-1030	21	—	X10	S5	300	Triode Sect.
8532	6.3	4310-7020	15	—	X20	S5	350	
8552	12.6	7250-0318	12	—	X10	S5	425	Cap-P
8628‡	6.3	3140-2080	12	—	X1	S4	625	USE ADAPTER [illegible]
Model 752A:								
8628	6.3	AC40-2080	12	—	X1	S4	625	
AX9903	12.6	1762-0340	35	—	X4	S5	625	RIGHT CAP-P USE HARDIE ADAPTER [illegible]
AX9903	12.6	1726-0340	35	—	X4	S5	625	Left Cap-P

Fine Points on Tube Testing

by William E. Burke

Consulting Editor, PF Reporter

It is common knowledge that the majority of troubles in electronic equipment are caused by tube failures. This is especially true of television receivers. This would not be too bad if only the tube failures were clearly indicated by symptoms; repair would consist simply of replacing the proper tube or tubes. The situation is complicated, however, by the fact that a high percentage of tube failures are not self-evident; they masquerade as failures of other components.

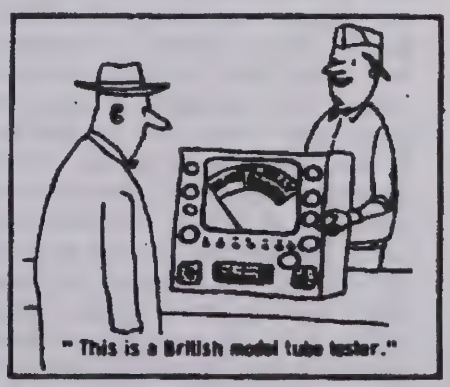
The VTVM and VOM are instruments bought and used by practically every service technician for the testing of components in television receivers. They are used to test resistors, capacitors, transformers, etc.; and their readings or indications are trusted and relied upon as guides to quicker servicing. If service technicians can implicitly trust such instruments, which only measure but do not judge conditions, they can surely buy and trust a tube tester with which to check tubes.

At this point, many service technicians will say, "I have a tube tester, and it's a pretty good one. But I don't use it because it tests some tubes as good when they won't work in a set." Such a situation probably exists in quite a few service shops. A considerable amount of money was expended on a tube tester, and it was used until the first or second time it led the service technician astray during a difficult repair. After that it was used only for testing tubes brought in by customers, or it was forgotten.

Most users of tube testers expect the instrument to be a judge of the condition of a tube and to be infallible in stating "bad" or "good." Their faith wavers when the tester proves otherwise. Actually, no tube tester can be 100% accurate in its indications, no matter what it costs; and, when cost is a prime factor, the quality and accuracy of the instrument has to suffer.

This decrease of accuracy of the tester itself, however, does not have to be detrimental to the accuracy of the results obtained by the operator. If the operator realizes the shortcomings of his instrument, he can allow for them and thereby get good service from the tester. A knowledge of the shortcomings of the various types of tube testers and a perusal of the instruction manual for your tester should help you efficiently use your tester and get a good return for the money you have invested in it. For those who have no tester at the present time, the information in these pages should serve as an argument for the purchase of one to suit your requirements. If you have a tester which is old and is only partly adequate for rapid and accurate tube testing, you should consider the purchase of a new one.

There are five basic tests used in tube testers to indicate the condition of the tubes being tested. These are: (1) a "shorts" test, (2) an emission test, (3) a transconductance test, (4) a gas test, and (5) a filament-current test. If each of these is treated independently (even though one tester may provide two or more of these tests), a better explanation of each can be made.



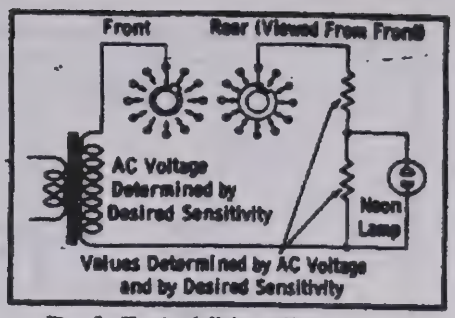

Front
Rear (Viewed From Front)
AC Voltage Determined by Desired Sensitivity
Neon Lamp
Values Determined by AC Voltage and by Desired Sensitivity

Fig. 1. Typical "shorts" test circuit.

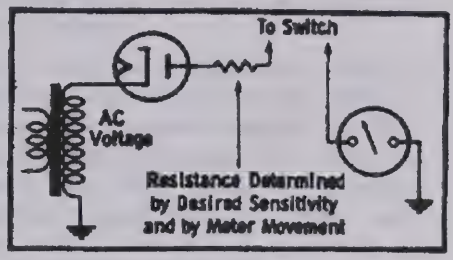


Fig. 2. Circuit for the measurement of interelectrode leakage.

Shorts Test

For the protection of the instrument, a "shorts" test of a doubtful tube should always be made first. It is possible for a tube to have an internal short which has not physically harmed the equipment in which it is used; yet the same tube might burn up the tube tester when checked for conductance.

The typical "shorts" test applies a voltage (usually AC) between each tube element and all the others as shown in Fig. 1. Any direct short or resistive path (leakage) between two elements will pass enough current to activate an indicator in series with the circuit. The less expensive instruments generally use a neon lamp as the indicator. A circuit of this type has one drawback in that series resistance must be used to keep the lamp from burning out when there is a direct short between two elements. This series resistance imposes a limit on the maximum resistive short that can be indicated to about one megohm.

There are circuits in which a leakage resistance of one megohm will have absolutely no effect. There are others in which a one-megohm leakage could disable the circuit and cause confusing symptoms. An IF amplifier tube with a leakage of one megohm between grid and cathode could cause AVC trouble symptoms. The more expensive testers get around this

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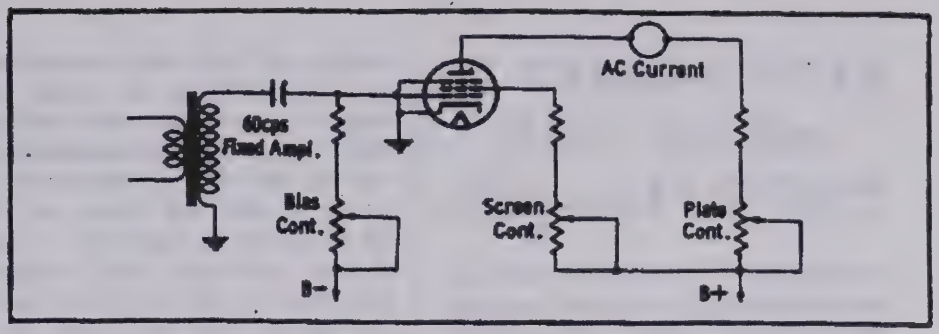


Fig. 3. Gm test-circuit hookup.

limitation by switching the "quality" meter into the "shorts" circuit as an ohmmeter. A considerably greater range of resistance measurements is obtained with this type of circuit (see Fig. 2).

One point to remember about any tube tester, whether it be expensive or not, is that it should have a "shorts" test. This is the most definite of all tests; when a tube checks shorted, it should definitely be discarded.

Emission Test

A vacuum tube is essentially an electron-emitting device, and without further knowledge, a person would suppose that a check of a tube's cathode emission would be a valid check of the tube. Up to a certain point, this is true; however, the proper operation of most tubes other than diodes depends more upon the control of the emitted electrons than upon their number. An emission check is not an entirely conclusive check, but it can be used to great advantage if interpreted properly.

It might seem that an emission check of a diode would be adequate because no grid is incorporated to control electron flow. Even for a diode, however, the emission test can be inadequate if it is not made under conditions which will draw practically all of the available electrons out of the cathode. Suppose, for example, an inexpensive tester were being used to check a 5U4G tube. For purposes of economy, the manufacturer of the tester may have used a power supply capable of drawing only 100 milliamperes of plate current (which is adequate for most tubes). The cathode (filament in the case of the 5U4G) might easily emit enough electrons to produce the 100 milliamperes of current, and the tube will check "good," but the emitting element might not provide enough electrons for the 150 or 200 milliamperes needed by the equipment in which the tube is used. This tube would not provide proper operation of the circuit, yet the tester indicated that it was a good tube.

On the other side of the argument is the fact that the emission checker can be useful and accurate. When such a tester shows a tube as being "bad," the indication usually can be trusted. A tube which does not have sufficient emission cannot operate properly no matter how well the grid controls the electron flow.

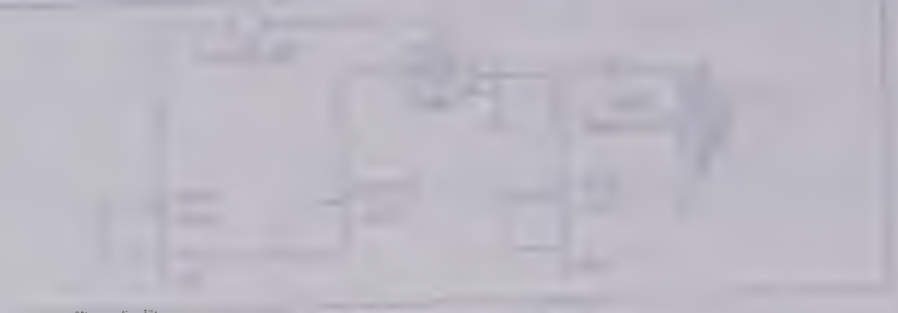
Mutual Conductance Test

Mutual conductance, often called transconductance and abbreviated as Gm, is a measure of the effectiveness of a tube as an amplifier; it is expressed as a change in plate current produced by a change in grid voltage. In the typical transconductance tester, a small alternating voltage is applied to the control grid and an AC meter is used to measure the resulting alternating plate current (see Fig. 3). This test is made under dynamic conditions which duplicate the circuit operation more closely than do the static conditions imposed upon the tube by an emission checker.

In a variation of this test, a high-frequency grid signal is used in place of the 60-cycle voltage obtained from the power supply. A tuned circuit extracts the amplified signal from the plate circuit and applies it to the meter. A greater accuracy in the Gm test and freedom from 60-cycle hum troubles is thus obtained.

Gas Test

A vacuum tube never lives up to its name because it can never have a perfect vacuum. Some gas



is always present, originating from the element materials or leaking through the tube envelope. Gas molecules interfere with electron flow and, in more than minimum quality, can affect proper operation of the tube. A test for gas content is desirable because troubles due to gassy tubes are usually ambiguous and hard to find.

The control grid in a tube can at times become contaminated with some of the oxide material from the cathode and emit electrons after the tube heats up. This condition is referred to as grid emission and will exhibit symptoms similar to those obtained with a gassy tube. The gas test in a good tester should be able to indicate both of these conditions.

The gas test usually involves setting up the tester for a measurement of either emission or transconductance and then switching a high series resistance into the control grid circuit. The presence of gas or grid emission will cause grid current to flow, and the voltage drop across the resistance will cause the grid bias and the plate current to change. The tester manufacturer generally gives the maximum change allowable for a good tube.

Filament-Current Test

Tubes intended for use in series-string receivers require a new test that is being provided on many currently-made testers. This test constitutes a measurement of the current drawn by the filament when the rated voltage is applied. The operation of these tubes is critical with regard to the amount of power applied to the filament, and any decrease in current will affect their performance. A series-string tube should be discarded when the current drawn by the filament at its rated voltage is considerably different from the specified value.

Older testers used by many shops do not have provisions for this test. In view of the number of series-string receivers being made, the shop owner should consider purchasing an instrument capable of making this test.

A comprehensive tester should provide for four of the five tests listed; either emission or transconductance plus all of the others. The point in question now is whether the emission or transconductance test is the best. This is determined in part by the circuit in which the tube is to be used. In the case of an RF or IF amplifier tube, the stage gain is proportional to the transconductance; thus the Gm test is the most important. In the case of an output or power rectifier tube, it must be capable of supplying large amounts of current; here, the emission test is most important.

A transconductance test must be made with the least possible amount of AC voltage on the grid for the most accuracy. Consider the case of a high-current triode such as those used for vertical-output stages. Such a tube must handle a grid signal of 100 volts and more, and therefore a transconductance test could hardly be accurate in telling you whether such a tube would work properly. No matter what tester is used, there are some tubes which cannot be checked completely and accurately. No tube tester provides the high voltage with which a 1B3GT should be tested. No tube tester tests UHF tubes at high frequencies.

Most technicians do and should rely on tube substitution in some cases. If you develop a technique which combines both testing and substitution, your servicing time is bound to be shortened. Every technician should develop his own set of rules to help him to determine whether he should test or substitute tubes. A typical set of rules might be:

1. When the receiver has one clear and distinct symptom, substitute tubes. This is quicker.
2. To partially insure yourself against callbacks, test all the tubes in a receiver before returning it. The bad or partially bad tubes you catch means increased sales as well as satisfied customers.
3. In the customer's home, substitute tubes. This is quicker.
4. When an older receiver is encountered, test all the tubes. This can prevent wasted time on difficult troubles due to more than one tube being bad.

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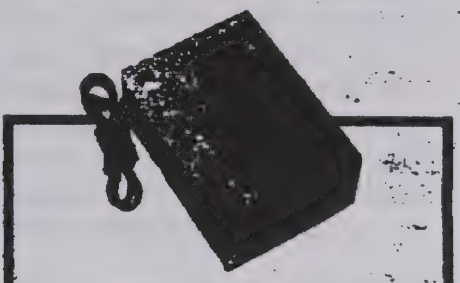
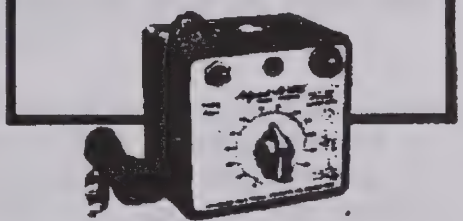
Combines features of both variable and isolation transformers. Drop line voltage to check faulty oscillator. Cook set to breakdown intermittent parts. Isolated primary winding eliminates chassis touching jitters. No service bench is complete without an Adjust-A-Volt!



Model	Input Volt.	Output Volt.	Amps. Max.	Net Price
LR-5	115	70-140	5.0	$29.50
LR-10	115	70-140	10.0	57.50
LR-24	230	70-140	10.0	61.50

METERED MODELS

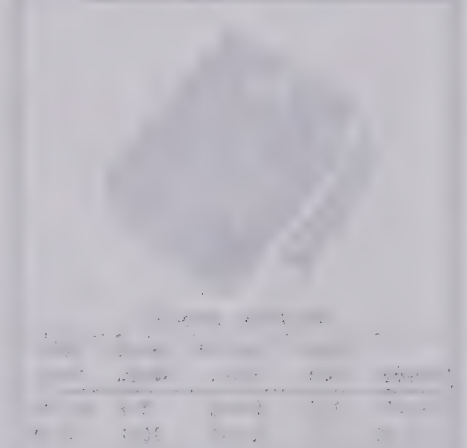
Model	Input Volt.	Output Volt.	Amps. Max.	Net Price
LRL-5	115	0-140	5.0	$41.50
LRL-10	115	0-140	10.0	69.50

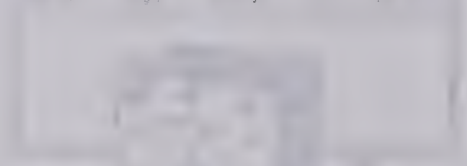


PA-1 AUTO-TRANSFORMER. Low cost, $13.50. small compact auto-transformer ideal for controlling soldering iron heat for repair of printed circuits.

Write for Adjust-A-Volt catalog showing complete line.

STANDARD
ELECTRICAL PRODUCTS CO
2230 E. THIRD ST. DAYTON





• PHILCO SERVICE HINTS & TIPS •

PHILCO SERVICE HINTS & TIPS - NUMBER 33
Aligning the Magnetic Tuning System

In 1937 and 1938, Philco introduced radio models that had an automa tuning dial mechanism. These were in 1937; Models 37-9, 37-10, 37- 37-116, 37-675, 37-690 and in 1938; Models 38-1, 38-2, 38-3, 38-1 38-690. Due to minor mechanical inaccuracies in repeatedly tuning to same dial presets, automatic frequency control was employed which Phi called Magnetic Tuning. Here is a brief description of this unique circuit a how to align it re-printed from a John F. Rider publication of 1937.

The Magnetic Tuning System employed in some Philco receivers is system of automatic frequency control designed to make possible qu and accurate tuning and to compensate for the effects of oscillator drift. I composed of two principal units; (1) the discriminator, which determir whether the set is mistuned and which provides control voltages whc magnitude and polarity indicate the extent and direction of the mistuni and (2) the control circuit, which, in response to the control voltag changes or shifts the oscillator frequency accordingly.

The control circuit does not present any problem from the point of view alignment since there are no adjustments required. However, it extremely important that the discriminator transformer be accurat aligned at the intermediate frequency. As you will observe by glanci through the alignment instructions for any one of the receivers equipp with a Magnetic Tuning system, the receiver is first aligned in the us manner with the Magnetic Tuning switch in the off position. This incluc the complete I-F., oscillator, and R-F. adjustments and also the prim winding of the discriminator transformer, since this winding feeds second detector. We repeat: these adjustments must be made with Magnetic Tuning switch in the "off" position.

With these adjustments completed, it remains to adjust the second trimmer of the discriminator transformer. This is accomplished in following manner: Couple the signal generator to the antenna of receiver and set the frequency to 1000 K.C. Tune in the signal v carefully for maximum output. A strong value of input signal must be us Without disturbing any of the settings, the Magnetic Tuning switch sho be turned to the "on" position and the secondary trimmer of discriminator transformer adjusted for maximum output.

When the Magnetic Tuning system is functioning properly, there will no hiss or change in tone as the automatic tuning switch is shifted on a off. If there is a change in tone or a hiss, it indicates that a frequency s

has taken place, and the adjustment of the secondary discrimina trimmer should be repeated.

From Aligning Philco Receivers - by John F. Rider, 1937, p.XXXI

• BACK TO SERVICE TIPS •

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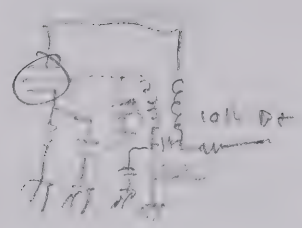
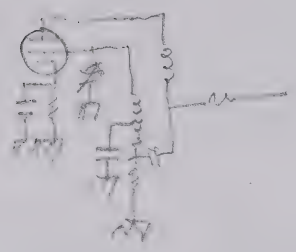
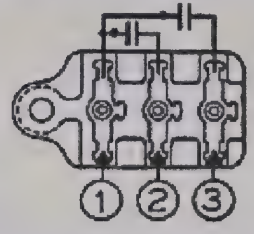




Service Bulletin No. 289, August 1937

UNIVERSAL TYPE 3615 (.05 Mfd.)

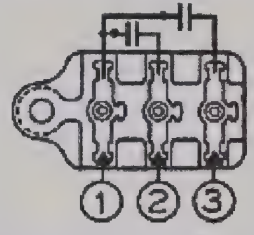
Working Voltage 400



Part No.	No. of Cap. Sections	Capacity Wiring Lugs	
		1 & 3	1 & 2
3615-ODG	2	.05	.05
3615-ODU	1	.05	.05
3615-OSG	1	.05	- - -
3615-OSU	1	.05	- - -
3615-XG	2	.05	.0014
3615-YU	2	.05	.03

UNIVERSAL TYPE 3793 (.015 Mfd.)

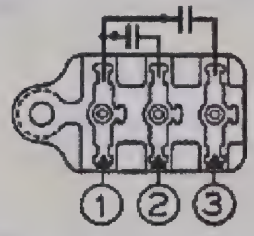
Working Voltage 600



Part No.	No. of Cap. Sections	Capacity Wiring Lugs	
		1 & 3	1 & 2
3793-ODG	2	.015	.015
3793-ODU	2	.015	.015
3793-OSU	1	.015	- - -
3793-SG	1	.015	- - -

UNIVERSAL TYPE 3903 (.01 Mfd.)

Working Voltage 600

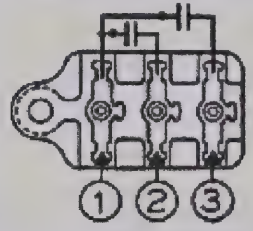


Part	No. of Cap.	Capacity Wiring Lugs

No.	Sections	1 & 3	1 & 2
3903-DG	2	.01	.01
3903-DU	2	.01	.01
3903-LU	2	.01	.006
3903-ODU	2	.01	.01
3903-OSG	1	.01	- - -
3903-OSU	1	.01	- - -

UNIVERSAL TYPE 4989 (.10 Mfd.)

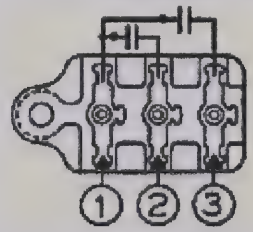
Working Voltage 200



Part No.	No. of Cap. Sections	Capacity Wiring Lugs 1 & 3	1 & 2
4989-CU	2	.10	.05
4989-FG	2	.10	.01
4989-OFU	2	.10	.01
4989-HG	2	.10	.15
4989-ODG	2	.10	.10
4989-ODU	2	.10	.10
4989-OSG	1	.10	- - -
4989-SU	1	.10	- - -

UNIVERSAL TYPE 6287 (.15 Mfd.)

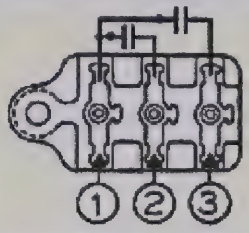
Working Voltage 200



Part No.	No. of Cap. Sections	Capacity Wiring Lugs 1 & 3	1 & 2
6287-CU	2	.15	.05
6287-ODG	2	.15	.15
6287-ODU	2	.15	.15
6287-SG	1	.15	- - -
6287-SU	1	.15	- - -

UNIVERSAL TYPE 7296 (.002 Mfd.)

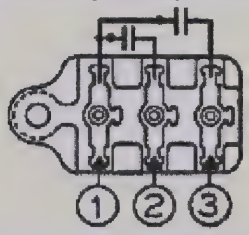
Working Voltage 1000



Part No.	No. of Cap. Sections	Capacity Wiring Lugs	
		1 & 3	1 & 2
7296-DG	2	.002	.002
7296-ODU	2	.002	.002
7296-SG	1	.002	- - -
7296-SU	1	.002	- - -

UNIVERSAL TYPE 7442 (.005 Mfd.)

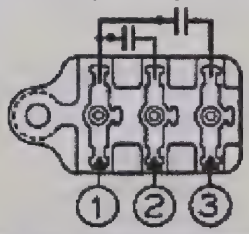
Working Voltage 1000



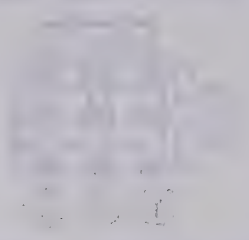
Part No.	No. of Cap. Sections	Capacity Wiring Lugs	
		1 & 3	1 & 2
7442-DG	2	.005	.005
7442-SG	1	.005	- - -

UNIVERSAL TYPE 7625 (.006 Mfd.)

Working Voltage 1000

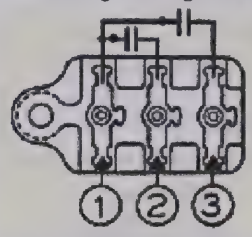


Part No.	No. of Cap. Sections	Capacity Wiring Lugs	
		1 & 3	1 & 2
7625-DG	2	.006	.006
7625-DU	2	.006	.006
7625-SG	1	.006	- - -
7625-SU	1	.006	- - -



UNIVERSAL TYPE 7653 (.025 Mfd.)

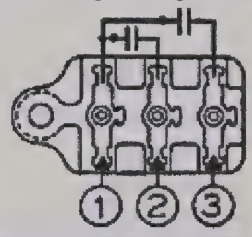
Working Voltage 600



Part No.	No. of Cap. Sections	Capacity Wiring Lugs	
		1 & 3	1 & 2
7653-DG	2	.025	.025
7653-DU	2	.025	.025
7653-OSG	1	.025	- - -
7653-OS	1	.025	- - -

UNIVERSAL TYPE 7762 (.001 Mfd.)

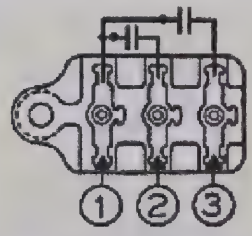
Working Voltage 1200



Part No.	No. of Cap. Sections	Capacity Wiring Lugs	
		1 & 3	1 & 2
7762-DG	2	.001	.001
7762-DU	2	.001	.001
7762-FU	2	.001	.011
7762-OEU	2	.001	.015
7762-OSU	1	.001	- - -

UNIVERSAL TYPE 8035 (.00011 Mfd.)

Working Voltage 1200

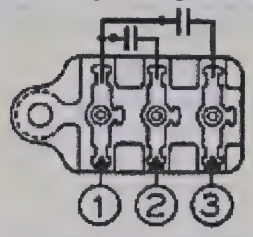


Part No.	No. of Cap. Sections	Capacity Wiring Lugs	
		1 & 3	1 & 2
8035-EU	2	.00011	.015
8035-ODG	2	.00011	.00011

8035-ODU	2	.00011	.00011
8035-SG	1	.00011	- - -
8035-SU	1	.00011	- - -

UNIVERSAL TYPE 8174 (.007 Mfd.)

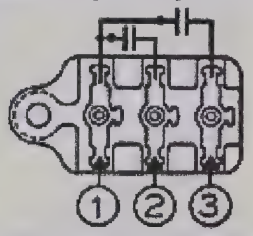
Working Voltage 1200



Part No.	No. of Cap. Sections	Capacity Wiring Lugs	
		1 & 3	1 & 2
8174-DG	2	.007	.007
8174-DU	2	.007	.007
8174-SG	1	.005	- - -

UNIVERSAL TYPE 8317 (.00025 Mfd.)

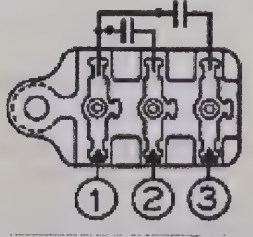
Working Voltage 1000



Part No.	No. of Cap. Sections	Capacity Wiring Lugs	
		1 & 3	1 & 2
8317-DU	2	.00025	.00025
8317-ODG	2	.00025	.00025
8317-OSG	1	.00025	- - -
8317-SU	1	.00025	- - -

UNIVERSAL TYPE 8318 (.03 Mfd.)

Working Voltage 400

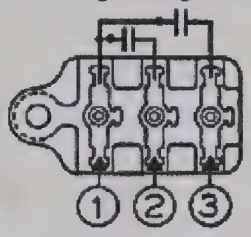


Part No.	No. of Cap. Sections	Capacity Wiring Lugs	
		1 & 3	1 & 2

8318-DG	2	.03	.03
8318-DU	2	.03	.03
8318-OSG	1	.03	- - -
8318-SU	1	.03	- - -

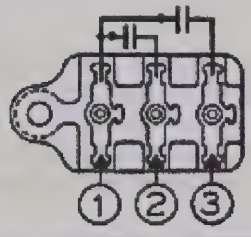
UNIVERSAL TYPE 8320 (.003 Mfd.)

Working Voltage 600



Part No.	No. of Cap. Sections	Capacity Wiring Lugs	
		1 & 3	1 & 2
8320-DG	2	.003	.003
8320-DU	2	.003	.003
8320-SG	1	.003	- - -

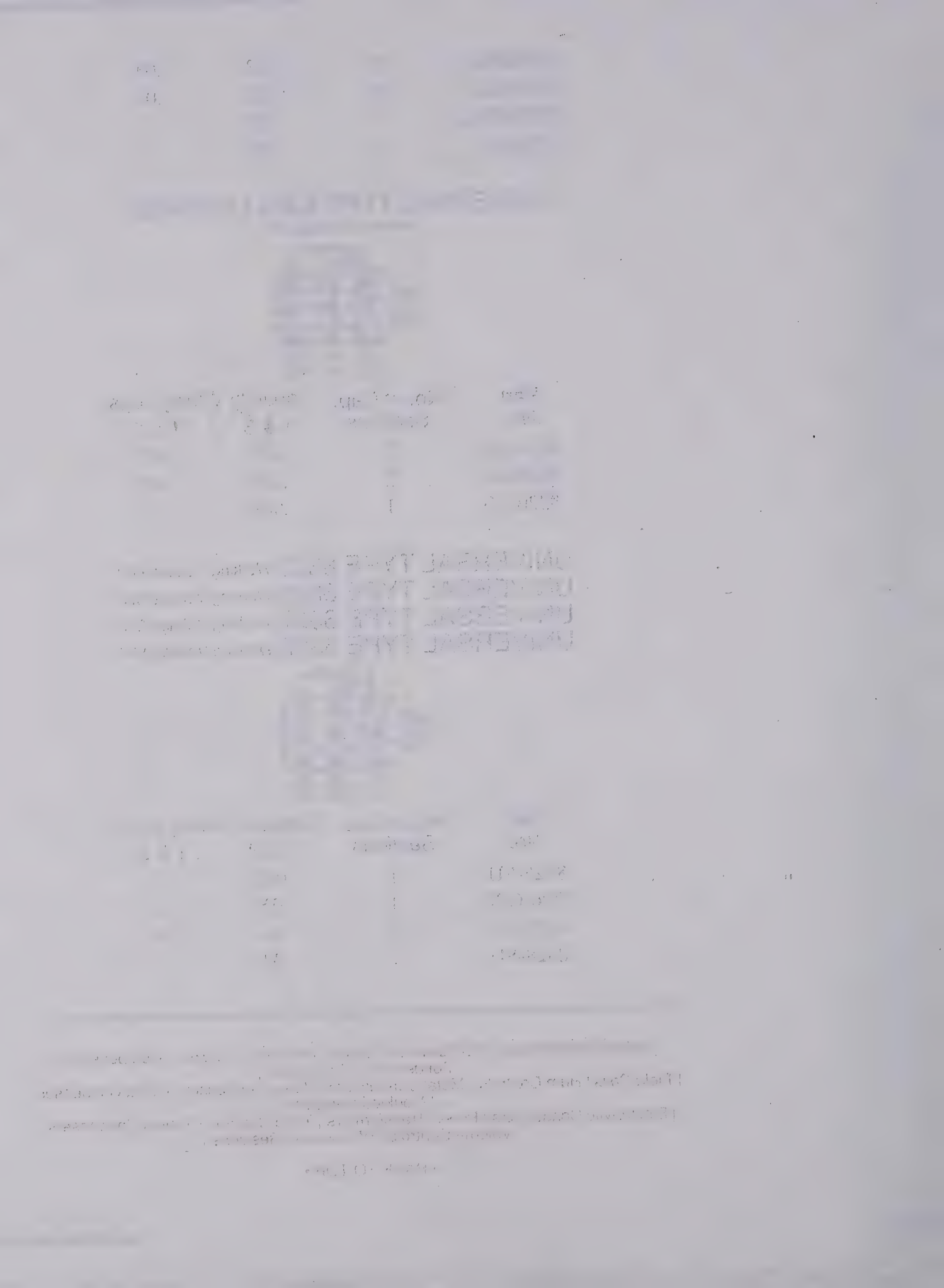
UNIVERSAL TYPE 8325 Working Voltage 600
UNIVERSAL TYPE 8326 Working Voltage 600
UNIVERSAL TYPE 8327 Working Voltage 200
UNIVERSAL TYPE 8328 Working Voltage 600



Part No.	No. of Cap. Sections	Capacity Wiring Lugs	
		1 & 3	1 & 2
8325-SU	1	.008	- - -
8326-OSU	1	.05	- - -
8327-DU	2	.04	.04
8328-SU	1	.03	- - -

Audio Transformers	BC Resistors	Carbon Resistors	Chokes	Compensating Condensers	Dial Lamps
Field Coils	Hum Controls	Metal Condensers	Paper Condensers	Mica Condenser	Moulded Resistors
Electrolytic Condensers	Power Transformers	Tone Controls	Tuning Condensers Volume Controls	Wire-wound Resistors

• BACK TO TOP •



ABC's of Capacitors - Capacitor Tips for Tube Radios

CAPACITOR TIPS for the beginner. If you are new to restoring antique tube radios here are some useful CAPACITOR TIPS. How to choose capacitors and install them in tube radios is explained in non-technical language. We hope you find this capacitor advice useful re your vintage radio repairs and restorations.

Capacitor Tips (for the beginner) :

Tube Radio CAPACITOR Basics

- Your vintage tube radio needs both direct current (DC) and alternating currents (AC) to operate. Capacitors act to pass AC while blocking DC. Capacitors are used to block, pass, filter and tune the various currents in your radio.

- Don't let terminology confuse you....."condenser" is just an old fashioned name for "capacitor". If you're not the best speller, a condenser, capacitar, capaciter, capacitor, condensar and condensor are also the same.

- Capacitors have a capacitance value and a voltage rating. The capacitance value is a measure of how much electric charge a capacitor can store. The voltage rating is the maximum voltage the capacitor can handle without breaking down.

- Your old tube radio uses 4 types of capacitors: variable (tuning) capacitors, mica capacitors, paper capacitors and electrolytic (filter) capacitors. When you restore an antique radio you will **replace the paper and electrolytic capacitors, but not the variable and mica capacitors.**

- In radio service parts lists and schematics, paper and electrolytic capacitors are usually expressed in terms "microfarads". Short forms for microfarad include mfd, MFD, MF, UF and uF. The mica capacitors in your tube radio will have lower capacitance values than the paper and electrolytic capacitors. Micas are expressed in terms of micromicrofarads (picofarads). Short forms for micromicrofarads include mmfd, MMFD, MMF, PF and pF. A pF is one-millionth of a uF. For example, a mica capacitor valued at 500 mmfd (pF) would be 0.0005 mfd (uF). When reading schematics and buying capacitors, you sometimes have to be able to convert uF to pF or pF to uF. For your convenience we have a Capacitor uF-nF-pF Conversion Chart that you can refer to. You may want to tape this conversion chart to your workbench.

- As a general rule, if a capacitor in your vintage tube radio is less than 0.001 uF, it is probably a mica capacitor. If it is between 0.001 uF and 1.0 uF it is likely a paper capacitor and if it's more than 1 uF it's probably an electrolytic capacitor.

- Size wise, the electrolytics are the largest capacitors and most tube radios use 2 or 3 of them. The original electrolytic capacitors are typically the size of a roll of quarters or larger. On the old AC sets they are usually encased in aluminum and mounted on top of the chassis. With the lightweight AC/DC sets of the 1950's they are quite often under the chassis and may

have a cardboard case.

- The original paper capacitors in your radio will likely be in a brown paper tubular case (sometimes coated with wax). They are usually 1 to 1 1/2 inches long and 1/4 to 1/2 inches in diameter.

- Mica capacitors come in different sizes and shapes, but the most common shape is square or rectangular....brown in color with colored dots (sort of look like "dominos").

- Capacitors have either "radial" leads or "axial" leads. With "radial" type, both leads exit from the same end of the capacitors. With "axial" type, there is a lead at each end of the capacitors. Both types are equally good. Just **be sure the capacitors you order have long leads.**

- On schematic diagrams the flat side of the capacitor symbol is the positive (+) side and the curved side is the negative (-) side. The positive end must be kept at the higher electrical potential (more positive voltage). Modern film capacitors are non-polar, so you don't have to worry about polarity when replacing old paper caps with new film capacitors.

- How about using NOS (**New "Old Stock") capacitors? These are not recommended**...use at own risk! As paper and electrolytic capacitors age their capacitance values drift, they dry out and they become leaky. Would you drive a 1930's automobile with NOS 70-year-old tires?

- Don't waste your money on audiophile, computer grade or tantalum capacitors. Sure they are good capacitors, but your old tube radio does not have the electronic circuitry to take advantage of those expensive capacitors. The only difference you will notice is a lighter wallet.

- Plastic / polyester film capacitors are now used in place of paper capacitors due to their smaller size, lower cost and superior performance. There are many variations of plastic / polyester capacitors. Good types of film capacitors for tube radio restorations include metalized polyester, metalized polypropylene, metal-foil polypropylene, polystyrene and mylar. What is a Mylar? Mylar is simply the trade name of the synthetic film registered by duPont

- At higher frequencies polypropylene and polystyrene are more stable that polyester, so **for film capacitors *under 0.01 mfd*, you may want to use polypropylene or polystyrene capacitors** rather that polyester capacitors.

- What should it cost you to replace the capacitors in your radio? To "recap" a typical tube radio you will need two or three electrolytic capacitors, one or two line filter interference suppression safety capacitors and about a dozen film capacitors.....Total cost for these parts should be $15 or less.

Non-Electrolytic CAPACITOR Tips

- When replacing old paper/wax capacitors, you can't go wrong using film capacitors that have a higher voltage rating than the paper ones you are replacing. For example, if you are replacing a paper capacitor rated at 400 volts, you can use a 630-volt film capacitor (but not a 200-volt capacitor). A film capacitor with a higher voltage rating will give your tube radio better reliability and longer life.

- Why were tube radios manufactured with 200, 400 and 600 volt paper capacitors if 600 volt could have been used for all the capacitors? Two reasons... cost and size. Capacitors used to be expensive so if a manufacture could use lower voltage capacitors in a circuit, it could cut production costs. Also, the higher the voltage the larger the paper capacitor, so it was easier to install lower voltage paper capacitors. Now-a days, film capacitors are inexpensive and compact, so **use 630 volt film**

capacitors and you can't go wrong.

- Radio Schematics and parts lists sometimes do not specify the working voltages of non-electrolytic capacitors. To be safe use a film capacitor rated at 630 volts.

- Old paper/wax capacitors are one of the most unreliable parts in an old radio. Don't let "molded" paper capacitors fool you. They are just paper capacitors in plastic cases and are just as unreliable as the ones coated in wax.

- Modern non-electrolytic capacitors i.e. mica capacitors, film capacitors, ceramic capacitors, etc are non-polar. This means you don't have to worry about which end to connect when replacing old paper capacitors with new film capacitors.

- Although non-polar, old paper capacitors had black bands at one end. The black band indicated which end of the paper capacitor had some metal foil (which acted as a shield). The end with the metal foil was connected to the ground (or lowest voltage). The main purpose of the foil shield was to make the paper capacitor last longer.

- When replacing paper capacitors with film capacitors keep in mind that capacitance values are "easy to please". The uF value does not need to be exactly the same. For example; if replacing a 0.05 uF capacitor you can use a 0.047 uF; if replacing a 0.002 uF you can use 0.0022 uF. These replacements are virtually identical. If you are +/- 10% you be well within your radios factory specifications. **(Just be sure your replacement capacitor has a working voltage is equal or greater than the original paper capacitor)**

Electrolytic CAPACITOR Tips

- Electrolytic capacitors are often referred to a "filter capacitors". Electrolytic capacitors help to convert (filter) AC (alternating current) power into the DC (direct current) voltage that your radio tubes need to operate.

- Size wise, the electrolytics are the largest capacitors. On older sets they are usually encased in aluminum (can type) and mounted on top of the chassis. If they are not on top of the chassis you will find them under the chassis.

- Capacitors used to be much larger and much more expensive than they are today. To save on space and cost "multiple section" electrolytics were used. These are simply two, three or four capacitors in the same case. You will notice just one ground connection/wire (usually a "black" wire) as all the caps share that ground. These **"multi-section" caps can be replaced with single electrolytics.** Modern electrolytics are compact and will easily fit under the chassis. You should leave the old can capacitor on the chassis for original appearance. Just be sure to disconnect it.

- Electrolytic capacitors work hard and are probably the most unreliable part of an antique radio. As they wear out (or simply get old) you get that famous "tube radio hum". Yes, in most cases it is bad filter capacitors that are the cause of that hum. **WARNING! If you tube radio hums "turn it off and don't use it".** Bad electrolytics are not only hard on your ears; they are hard on the tubes, transformers and other parts in your radio. Capacitors are cheap….tubes and other parts can be expensive and hard to find.

- Electrolytic capacitors have a rated "working voltage" (WV) which is the voltage it can handle. Ideally, an electrolytic capacitor should be operated at a voltage between 1/3 and 3/4 of its maximum working voltage. This is enough voltage to keep the electrolyte from drying out while it allows some margin of safety for unexpected voltage surges. **Never replace an electrolytic with one that has a lower voltage rating.**

- As with paper capacitors, the capacitance value of an electrolytic capacitor is "easy to please", and an exact uF replacement is not necessary. For example, you can replace a 30 uF with a 33 uF or replace a 20 uF with a 22uF. If you can't find a close

replacement ...better to go with a higher uF value than a lower uF.

- The old "rule of thumb" when replacing electrolytic capacitors is to not use more than 80% higher (or 20% lower) than "the original" uF size. If you replace an E-cap with one that has too high a MFD, the DC voltages will be higher than called for and your tubes and other parts will wear out faster. If you use too low a uF size, your radio will hum.

- Warning ! Electrolytics have a negative end and a positive end.....if you install an electrolytic with the polarity mixed up not only will your radio not work...the electrolytic capacitor could explode. All the modern day electrolytic capacitors that JustRadios sells have an arrows (with negative signs) marked on them. This arrow with negative signs, points at the negative end of the electrolytic capacitor.

- As a general rule AC (tube radios with power transformers) can use 450 volt electrolytics while lightweight ac/dc tube radios can use 160 volt filter capacitors. However, there are exceptions so always best to refer to a schematic.

- Electrolytic capacitors have a shelf life of a couple of years, so **make sure you are buying "fresh" stock electrolytics (not new "old stock")**. Would you buy stale loaf of bread if a fresh one available?

- Electrolytic capacitors should be stored at temperatures of 5 to 35 degrees C (40 to 95 degrees F) and in non-humid conditions (less than 60 relative humidity) to maximize shelf-life.

- Don't put your tube radio into storage after you have restored the electric's. Once a month let the radio sing for a half-hour or so. This will prevent the electrolytic capacitors from drying out.

CAPACITOR Installation Tips

- When restoring an antique radio it standard practice to replace certain of the radios capacitors. This is known as "recapping" a radio. An old radio may work with it's original caps....but for how long ?? ....and how safely ?? If the radio is going to be sold with a guarantee or is being given to someone as a gift, you should "recap" the radio.

- You will want to **replace all the paper and electrolytic capacitors.** However, **"do not replace the mica capacitors".** Mica capacitors very rarely go bad and if you replace them it will throw off the radios tuning. Replacing the mica capacitors will do more harm than good. **Only replace a mica if you are sure it is bad** (which is rare).

- Like mica capacitors, ceramic capacitors also very rarely go bad. Do not replace ceramic disc capacitors unless you are sure one has gone bad.

- Some radios use what are known as "line-filter" capacitors. These capacitors connect across your radios power line and/or go from your power line to ground. When replacing these capacitors, you should use special ***AC Rated Safety Capacitors***. *These special capacitors with improve the safety, performance and reliability of your radio*. If you would like to learn more about these "safety capacitors", there is a link to the ABC's of Safety Capacitors near the bottom of this page.

- Get a schematic (and parts list) before you start your recap job. It is often impossible to read the values that are on the original capacitors. Also, if the radio was repaired at some time in the past, there is a good chance someone threw in the wrong size capacitors, just to get the radio working. Without a schematic you'll be guessing.

- Before replacing the capacitors, check all the radios' resistors. Since you will be replacing the capacitors, you should snip one lead of each paper and electrolytic capacitor. This will help prevent false resistance readings. **All resistors that are off-spec**

should be replaced. When it come to tube electronics..."all resistors are not created equal", so when you replace a resistor be sure to use a resistor that has both a "voltage rating & wattage" that is equal to or greater than the original resistor. More information on **resistors for tube electronics**.

- **Put heat shrink (spaghetti) tubing on the leads of the capacitors** and resistors before you solder them into the circuit. This will help prevent dangerous shorts. **If you need some heat shrink tubing, just "let us know" and we will be glad to add some to your capacitor order at no charge.**

- Always check a capacitor before installing it. Although it is very rare, every once in a blue moon, a new capacitor will be defective or off spec. Taking ten seconds to check a capacitor can save you hours of troubleshooting.....only to find out you accidentally installed a brand new "bad" capacitor.

- If you need a higher uF than is available from your retailer, you can connect a couple of capacitors in parallel (side-by-side). For example if you need 200 uF at 450 volts you could connect two 100 uF / 450 volt capacitors in parallel and you would end up with 200 uF at 450 volts. You have kept the voltage the same while doubling the uF.

- In "theory" connecting capacitors in series (end-to-end) should result in a higher working voltage. For example "in theory" two 100 uF at 450 volts in series should give you 50 uF at 900 volts (double the voltage and half the uF).....however, **connecting capacitors in series is not recommended** because with a series connection, one capacitor will usually end up getting more voltage than the other. This is because the leakage resistances of the two capacitors are rarely the same and the capacitor with the higher resistance will get a greater share of the voltage (which will often result in a series connected capacitor breaking down).

- Please remember to always work safely. The high voltages stored in large capacitors can kill! If a radio has been turned on in recent weeks some of the capacitors (especially the electrolytic capacitors) may be holding deadly voltage charge. Before working with these capacitors they should be completely discharged. This can be come by (bridging) connecting the two ends the capacitor in question with a high wattage 1000 ohm resistor via insulated clips and leads.

- Last but not least...where can one buy the right sizes and right types of capacitors needed to restore a tube radio? You have found the right place....we are Dave and Babylyn Cantelon. We specialize in Capacitors for vintage tube radios. Got a tube radio capacitor question....email us at justradios@yahoo.com. Like to place a capacitor order...here is our Capacitor Order Form. .

About Us: We are Dave and Babylyn Cantelon and like yourself, we (well, at least one of us) like to restore old tube radios. We are also active in a number of Vintage Radio Clubs (AWA, MARC, IARC, LVRC, OVRA, OVRC, CVRS), both north and south of the US/Canadian border. Check out our Radio Links page if you would like to find a radio club to join. If you repair or restore old tube radios you know it can be hard finding the right high voltage capacitors, capacitors with the right capacitance values ... capacitors with high working voltages and capacitors with long leads for hand wiring. We believe you will find our capacitor product line useful re your antique tube radio repairs and restorations

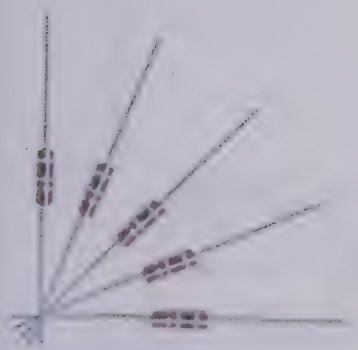
Dave and Babylyn Cantelon, 6 Ferncrest Gate, Scarborough, Ontario, Canada, M1W_1C2

E-mail: **justradios@yahoo.com**

Capacitors for Tube Radios:

hot Capacitor Kits for Tube Radios

Metalized Polypropylene Capacitors - 630 Volt and 1000 Volt **Axial** Tubulars
Metallized Polyester Film Capacitors - 630 Volt & 1000 Volt **Axial** Tubulars
Metallized Polyester Film Capacitors - 6000 Volts **Axial** Tubulars
Metal-Foil Polypropylene Capacitors- 630 Volt **Orange Dips**
Metallized Polyester Film Capacitors - 630 Volt **Orange Dips**
Metallized Polypropylene Capacitors- 1600 Volt **Orange Dips**
Silver MICA Capacitors- 500 Volts
Mylar Polyester Film Capacitors - "on sale by the 50"
Ceramic Disc Capacitors - 1600 Volts
High Voltage Electrolytic Capacitors - Radial Leads
High Voltage Electrolytic Capacitors - Axial Leads
NEW! Single Section **Can** Electrolytic Capacitors - 500 Volts
NEW! Dual Section **Can** Electrolytic Capacitors - 500 Volts
NEW! Capacitor Clamps for Can Electrolytic Capacitors
X1/Y2 Disc Safety Capacitors - 250VAC
Y2 Film Safety / Interference Suppression Capacitors - 250VAC
X2 Film Safety / Interference Suppression Capacitors - 275VAC



RESISTORS for Tube Radios
Resistor **$ Price List**
NEW! Resistor **KITS**

Heat Shrink (spaghetti) Tubing
Vintage Tube Radio **Dial Belts**

Antique Radio Schematics - JustRadios

ABC's of **Safety Capacitors** for Tube Radios.

This page was last updated on May 7, 2010.

CROSLEY
MODEL 56TP

CROSLEY
MODEL 56TP

CROSLEY MODEL 56TP

TRADE NAME	Crosley Model 56TP
MANUFACTURER	Crosley Corp., 1329 Arlington St., Cincinnati, Ohio
TYPE SET	AC Operated Combination Phono. - 2 Band Superheterodyne Receiver, Self Contained Loop Antenna
TUBES(FIVE)	Types, 12SA7GT Converter, 12SK7GT IF Amp., 12SQ7GT Det.-AVC-AF, 50L6GT Power Output, 35Z5GT Rectifier
POWER SUPPLY	105-125 Volts AC — RATING .255 Amps. @ 117V AC
TUNING RANGE—BROADCAST	540-1600KC — **SHORT WAVE** 5.8 - 15 MC

ALIGNMENT INSTRUCTIONS

Turn tuning condenser to completely closed position and set dial pointer on reference line. Use isolation transformer if available. If not, connect capacitor in series with the low side of the signal generator and B-. Set volume control at maximum volume and output from signal generator no higher than is necessary to obtain output reading. Use insulated alignment screwdriver for adjusting. Be sure correct peak is obtained when adjusting A5. Correct peak is second one heard as the trimmer adjustment screw is opened from a completely closed position. (Image should be heard 910KC lower than the fundamental on the receiver dial)

DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
200 MMF.	High side to ant lead. Low side to B-.	455KC	BC	High freq.end	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output
400Ω carbon resistor	"	15.3MC	SW	"	"	A5	" " " "
"	"	15.0MC	"	Tune for maximum output.	"	A6	" " " "
200 MMF.	"	1620KC	BC	High freq. end.	"	A7	" " " "
"	"	1400KC	"	Tune for maximum output.	"	A8	" " " "

HOWARD W. SAMS & CO., INC. • 2924 East Washington Street • Indianapolis 6, Indiana

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PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	REPLACEMENT DATA: CROSLEY PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	12SA7GT	12SA7GT	8AD	
2	IF Amp.	12SK7GT	12SK7GT	8N	
3	Det.-AVC-AF	12SQ7GT	12SQ7GT	8Q	
4	Power Output	50L6GT	50L6GT	7AC	
5	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: CROSLEY PART No.	MALLORY PART No.	SOLAR PART No.	SPRAGUE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
6A	60	150	W-134988	2N520	M-5030-150	EL-26		BRD5315	Filter - Red
B	20	100							" "
7	.05	200	39001-65	TP426	S-4-05	TC-15	484-05	DT4S2	Line Filter
8	.0033	600	39001-10	TP406	S-6-003	TC-23	684-003	DT6D3	Tone Compensation
9	.05	200	39001-65	TP426	S-4-05	TC-15	484-05	DT4S5	50L6 Plate Bypass
10	.022	200	39001-63	TP423	S-4-05	TC-12	484-02	DT4S2	Audio Coupling
11	.0033	600	39001-10	TP406	S-6-003	TC-23	684-003	DT6D3	" "
12	.1	200	39001-67	TP428	S-4-1	TC-1	484-.1	DT4P1	Line Isolation
13	.022	200	39001-63	TP423	S-4-02	TC-12	484-02	DT4S2	AVC Filter
14	.022	200	39001-63	TP423	S-4-02	TC-12	484-02	DT4S2	Conv. Screen Bypass
15	.075	200	39001-66	TP452	S-4-1	TC-1	484-075	DT4P1	Ant. Coupling
16	250	500	39001-73	MC240	M0.5-325	1FM-325	1468-00025	5W5T25	Audio Plate Bypass
17	50	500	B226638-53	MC225	M0.5-45	1FM-45	1468-00005	5W5Q5	Osc. Grid Capacitor
18	580	300	GC210685143						Fixed Padder SW

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: CROSLEY PART No.	MALLORY PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
19A	1 Meg.	1	C-46846-6	MR53	D13-137	M-63-Z	Volume Control
B	Shaft		Not Req.	Not Req.	A	Not Req.	Attach to 19A per instructions
C	Switch		" "	M28	41	SW-A	" " " " "

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: CROSLEY PART No.	IRC PART No.	IDENTIFICATION CODES
20	330KΩ	½	39281-28	BTS-330K	Or.-Or.-Yl. Convertor Grid
21	15 Meg.	½	39281-38	BTS-15 Meg.	Br.-Grn.-Blue AVC Network
22	22KΩ	½	39281-21	BTS-22K	Red-Red-Or. Oscillator Grid
23	250KΩ	½		BTS-270K	Red-Grn.-Yl. Line Isolation
24	3.3 Meg.	½	39281-34	BTS-3.3 Meg.	Or.-Or.-Grn. AVC Network
25	5 Meg.	½		BTS-4.7 Meg.	Grn.-Blk.-Grn. 1st AF Grid
26	470KΩ	½	39281-29	BTS-470K	Yl.-Vi.-Yl. 1st AF Plate Load
27	510KΩ	½		BTS-470K	Grn.-Br.-Yl. Output Grid
28	100Ω	½	39281-7	BW-½-100	Br.-Blk.-Br. Output Grid
29	1200Ω	1	39015-26	BTA-1000	Br.-Red-Red Filter
30	47Ω	1	W-137367	BT-1-47	Yl.-Vi.-Blk. Surge Limiter-See Note 1
31	150Ω	½	39281-8	BW-½-150	Br.-Grn.-Br. Line Dropping
32	470Ω	½	39281-11	BTS-470	Yl.-Vi.-Br. Decoupling

Note 1 - Not used in all models.

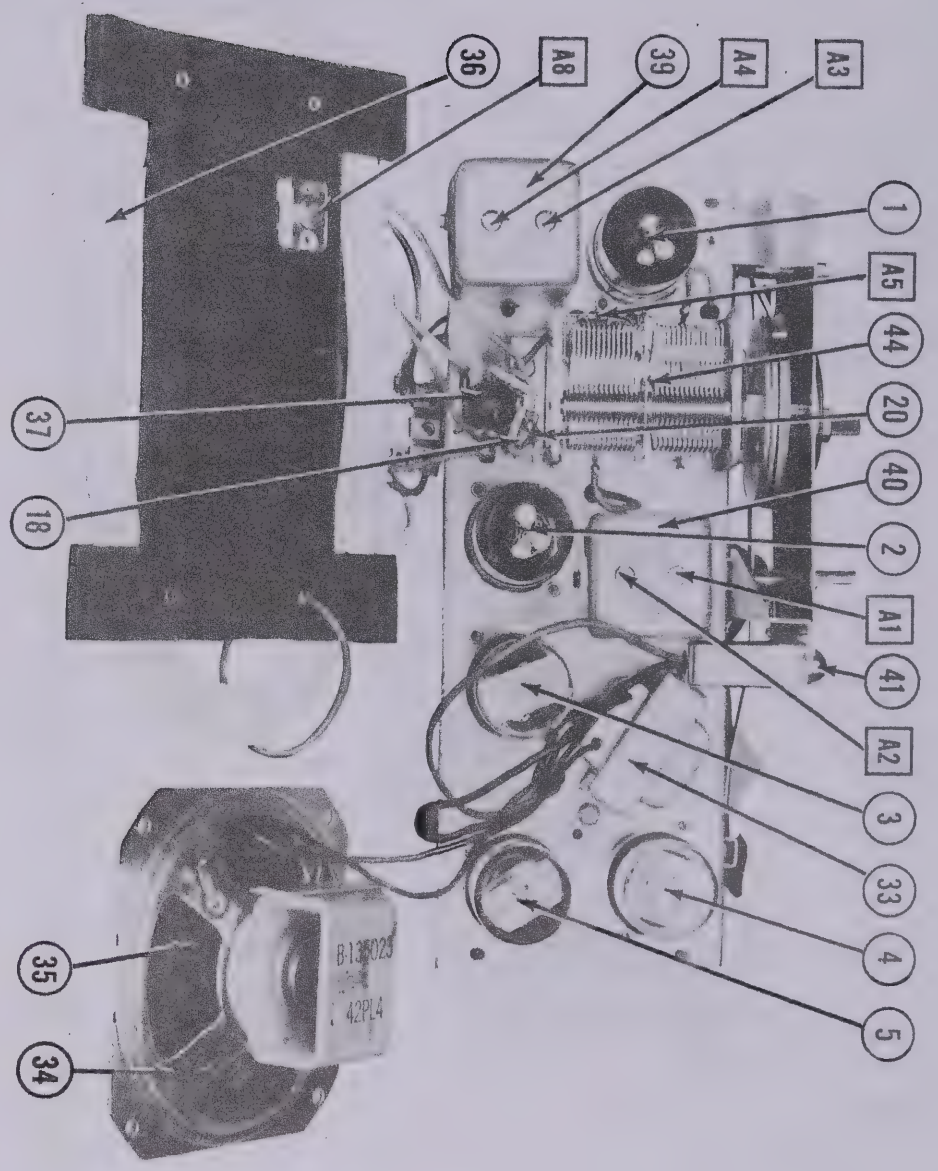
TRANSFORMER (OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: CROSLEY PART No.	STANCOR PART No.	THORDAR'N PART No.		INSTALLATION NOTES
33	2010Ω	3.2Ω	200Ω	.6Ω	B-134940	A-3876	T-22845		

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: CROSLEY PART No.	JENSEN PART No.		INSTALLATION NOTES
34	FIELD PM	VC IMP. 3.2Ω	R-135023	ST-113 Mod. P4-X		
35	CONE DIA. 4"	VC DIA. 1/2"	NOT READILY REPLACEABLE-USE COMPLETE SPEAKER UNIT			

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA CROSLEY PART No.	REPLACEMENT DATA MEISSNER PART No.	INSTALLATION NOTES
36	Loop Ant.	.8Ω	2Ω	AC134605		
37	SW Ant. Coil	.7Ω	.3Ω	AW134994		
38A	BC Osc. Coil	1Ω	6.8Ω	AW134993		Items 38A, 38B wound on same form
38B	SW Osc. Coil	.2Ω	0Ω	AW134993		
39	Input IF	22.3Ω	19.5Ω	AW134065	16-6658	
40	Output IF	27Ω		AW134158	16-6670	

DIAL LIGHT

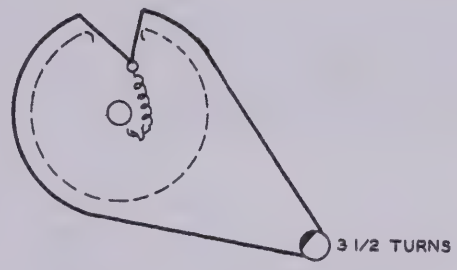
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA CROSLEY PART No.		INSTALLATION NOTES
41	Bayonet	6-8	0.15	Brown	W-48858		Type 47

MISCELLANEOUS

ITEM No.	PART NAME	CROSLEY PART No.	NOTES
42	Switch	W-134939	Tone Control
43	"	B-134720	Band Change
44	Tuning Cap.	B-134995	2 Gang Variable Cap.
A6	Trimmer Cap.	AB-134982	SW Ant. Adj.
A7	Trimmer Cap.	AB-134982	BC Osc. Adj.
	Dial Face	C-134869	
	Dial Pointer	B-134952	
	Cabinet	R-135021	
	Knob	W-134882	Volume or Tuning
	"	W-134742	Tone
	"	W-134924	Band Change
	Cartridge	136774-68	Pickup
	Phono-motor	136774-129	Motor only

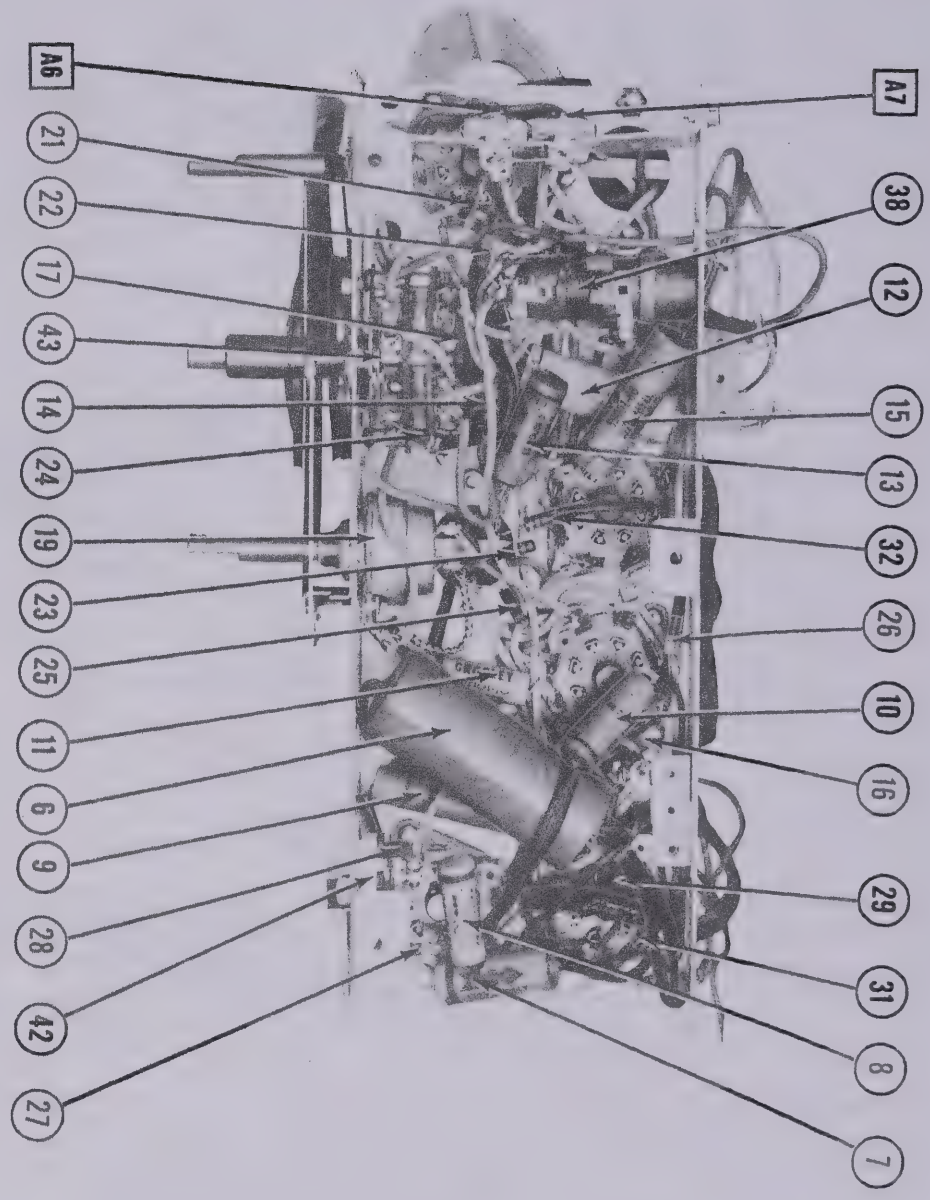
DISASSEMBLY INSTRUCTIONS

1. Remove the three push-on type control knobs and washers.
2. Unsolder the black and brown pick-up leads from terminal strip on chassis.
3. Remove three hex head screws and washers from chassis board.
4. Remove two nuts, washers and lock washers from the speaker bolts.
5. Remove the two Phillips head screws holding loop antenna to cabinet.
6. Remove two Phillips head screws holding phono-on-off switch to cabinet.
7. Remove phono-on-off switch cover and unsolder black and blue leads from terminals.
8. Remove chassis, speaker, and loop antenna from cabinet.
9. Unsolder black and short blue lead connection from phono-motor.
10. Remove seven fastener buttons holding chassis bottom cover plate to chassis. Remove plate.

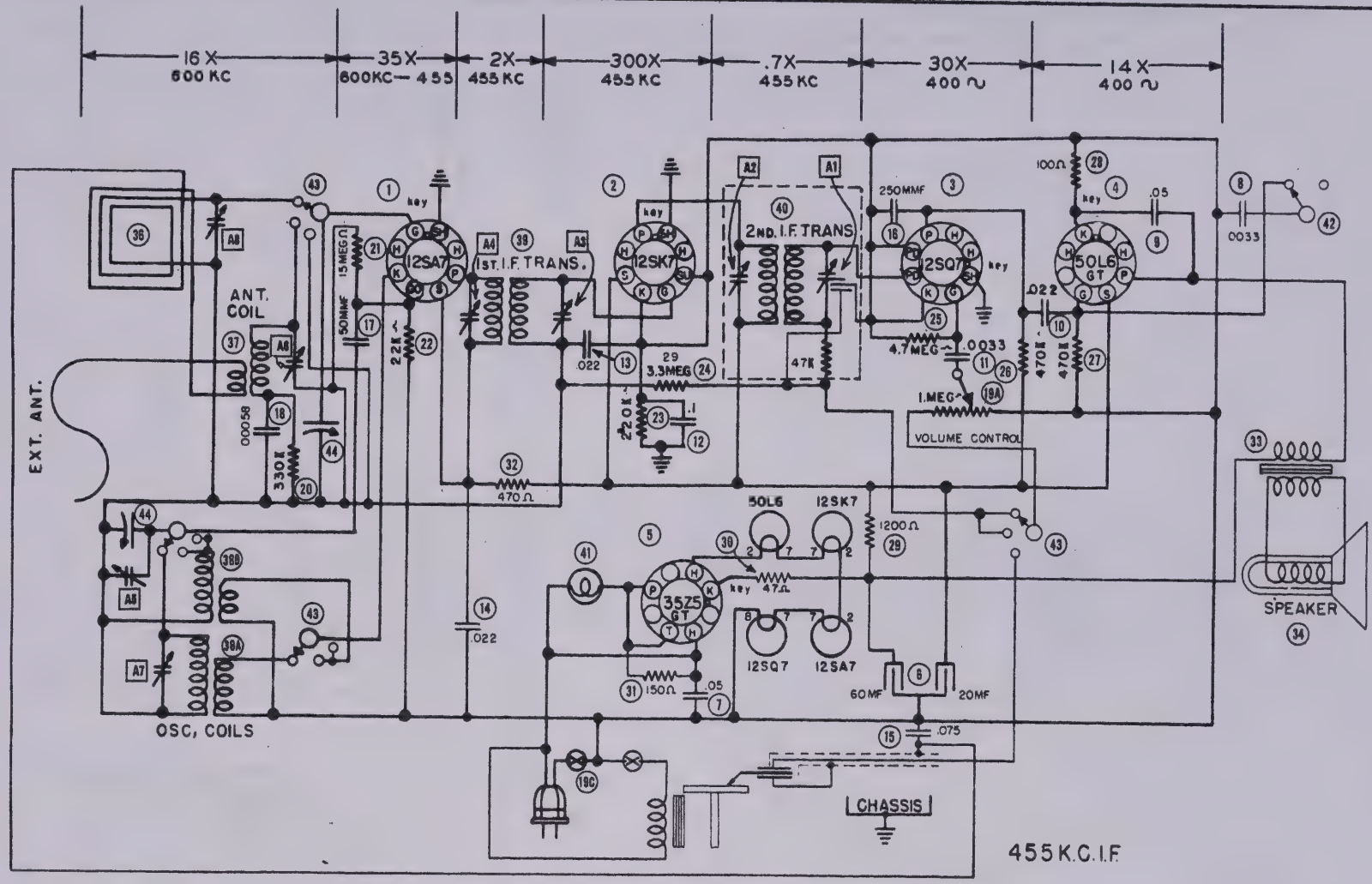


DIAL CORD DRIVE

CHASSIS—BOTTOM VIEW



CROSLEY MODEL 56TP



NOTE: VOLTAGE AND RESISTANCE READING TAKEN ON STANDARD BROADCAST BAND.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7GT	0V.	24V.AC	75V.DC	75V.DC	-2V.DC	0V.	12.5V.AC	-75V.DC
2	12SK7GT	0V.	24V.AC	0V.	-75V.DC	0V.	78V.DC	36V.AC	78V.DC
3	12SQ7GT	0V.	-55V.DC	0V.	-.4V.DC	0V.	44V.DC	12.5V.AC	0V.
4	50L6GT	0V.	36V.AC	112V.DC	78V.DC	0V.	0V.	88V.AC	4.4V.DC
5	35Z5GT	0V.	117V.AC	113V.AC	78V.DC	113V.AC	0V.	88V.AC	122V.DC

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	12SA7GT	225Kn	22n	30Kn	30Kn	20.5Kn	.5n	11n	3.2MEG.
2	12SK7GT	225Kn	22n	0n	3.2MEG.	0n	30n	33n	30Kn
3	12SQ7GT	225Kn	5MEG.	0n	975Kn	0n	500Kn	11n	0n
4	50L6GT	INF.	33n	30Kn	30Kn	620Kn	0n	77n	90n
5	35Z5GT	INF.	103n	100n	30Kn	100n	0n	77n	30Kn

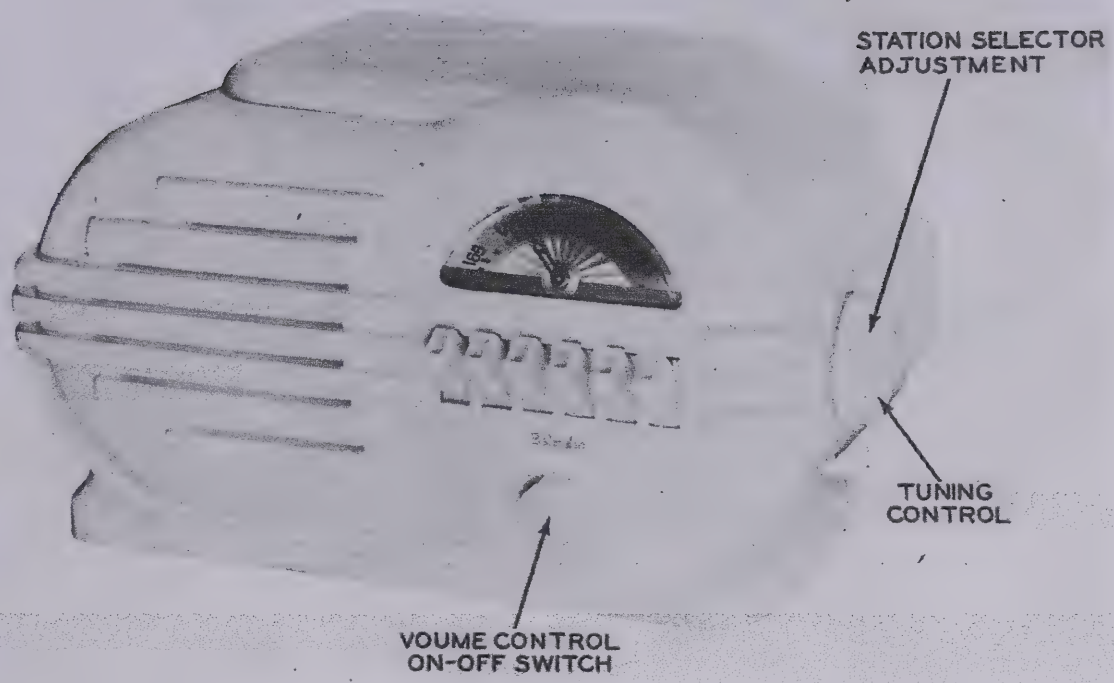
RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

468-5

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt battery bias substituted for measurement.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

BELMONT
MODEL 6D111 SERIES B



BELMONT
MODEL 6D111 SERIES B

BELMONT MODEL 6D111

TRADE NAME	Belmont Model 6D111 Series B
MANUFACTURER	Belmont Radio Corporation, 5921 W. Dickens Ave., Chicago 39, Illinois
TYPE SET	AC - DC Superheterodyne - Self Contained Loop Antenna
TUBES (SIX)	Types 12SK7 RF Amp., 12SA7 Converter, 12SK7 IF Amp., 12SQ7 Det.-AVC-AF, 35L6GT Power Output, 35Z5GT Rectifier
POWER SUPPLY	105-125 Volts AC-DC Rating .235 Amps. @ 117 Volts AC
TUNING RANGE—BROADCAST	530 to 1650KC SHORT WAVE

ALIGNMENT INSTRUCTIONS

DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
.1 MFD	High side to pin #8 (signal grid) of 12SA7. Low side to B-.	455KC	High freq. end of dial. Rotor full open)	Across voice coil	A1,A2, A3,A4.	Adjust for maximum output. Use isolation transformer if available. If not, isolating capacitor must be connected between generator ground lead and receiver B-. Also decrease dummy ant. to .001 MFD to prevent excessive hum modulation.
"	"	1650KC	"	"	A5	"
	Loop	1400KC	Tune in 1400 KC signal.	"	A6	Adjust for maximum output. Connect output of signal generator to loop of few turns of wire and radiate signal into receiver loop.

Place loop in same position it will be when the chassis is in the cabinet. Volume control at maximum and output from signal generator no higher than is necessary to obtain output reading. Use insulated alignment screwdriver for adjusting.

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	REPLACEMENT DATA: BELMONT PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	12SK7	12SK7	8N	
2	Converter	12SA7	12SA7	8R	
3	IF Amp.	12SK7	12SK7	8N	
4	Det.-AVC-AF	12SQ7	12SQ7	8Q	
5	Power Output	35L6GT	35L6GT	7AC	
6	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: BELMONT PART No.	MALLORY PART No.	SOLAR PART No.	SPRAGUE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
7(A)	40	150	11994	FP308	DY-40+30+20-150	EL-224	AF844D	UP4CJ1	■ Filter
(B)	20	150							▲ "
(C)	20	150							"
7(A)	60	150	A-8C-10946		DY-60+40+20-150	EL-340†		UP6CJ44	■ " *
(B)	40	150			M-20-150				▲ "
(C)	40	150				UT-201			"
8	.1	400	1001	TP428	S-4-1	TC-1	484-.1	DT4P1	Line Filter
9	.02	400	10028	TP423	S-4-02	TC-12	484-.02	DT4S2	35L6 Plate Bypass
10	.004	600	100106	TP407	S-6-004	TC-24	684-.004	DT6D4	Audio Coupling
11	.2	400	100110	TP429	S-4-2	TC-2	484-.2	DT4P2	Line Isolating
12	.002	600	10025	TP405	S-6-002	TC-22	684-.002	DT6D2	Audio Coupling
13	.05	200	1009	TP426	S-4-05	TC-15	484-.05	DT4S5	AVC Filter
14	.25	200	1006	TP430	S-4-25	TC-2	484-.25	DT4P25	RF Bypass Pwr. Supp.
15	.002	600	10025	TP405	S-6-002	TC-22	684-.002	DT6D2	Ant. Coupling
16	100	500	1295	MC235	MO.5-31	1FM-31	1468-.0001	5W5T1	Audio Plate Bypass
17	100	500	129161	MC235	MO.5-31	1FM-31	1468-.0001	5W5T1	RF Bypass Vol. Cont.
18	100	500	129131	MC235	MO.5-31	1FM-31	1468-.0001	5W5T1	RF Bypass Diode
19	100	500	1295	MC235	MO.5-31	1FM-31	1468-.0001	5W5T1	Osc. Grid Cond.
20	100	500	1295	MC235	MO.5-31	1FM-31	1468-.0001	5W5T1	RF Coupling
21	500	500	1292	MC245	MO.5-35	1FM-35	1468-.0005	5W5T5	RF Grid Coupling

*Used in 25 Cycle Models only.
†Parallel two 40 MFD sections to obtain desired capacity.

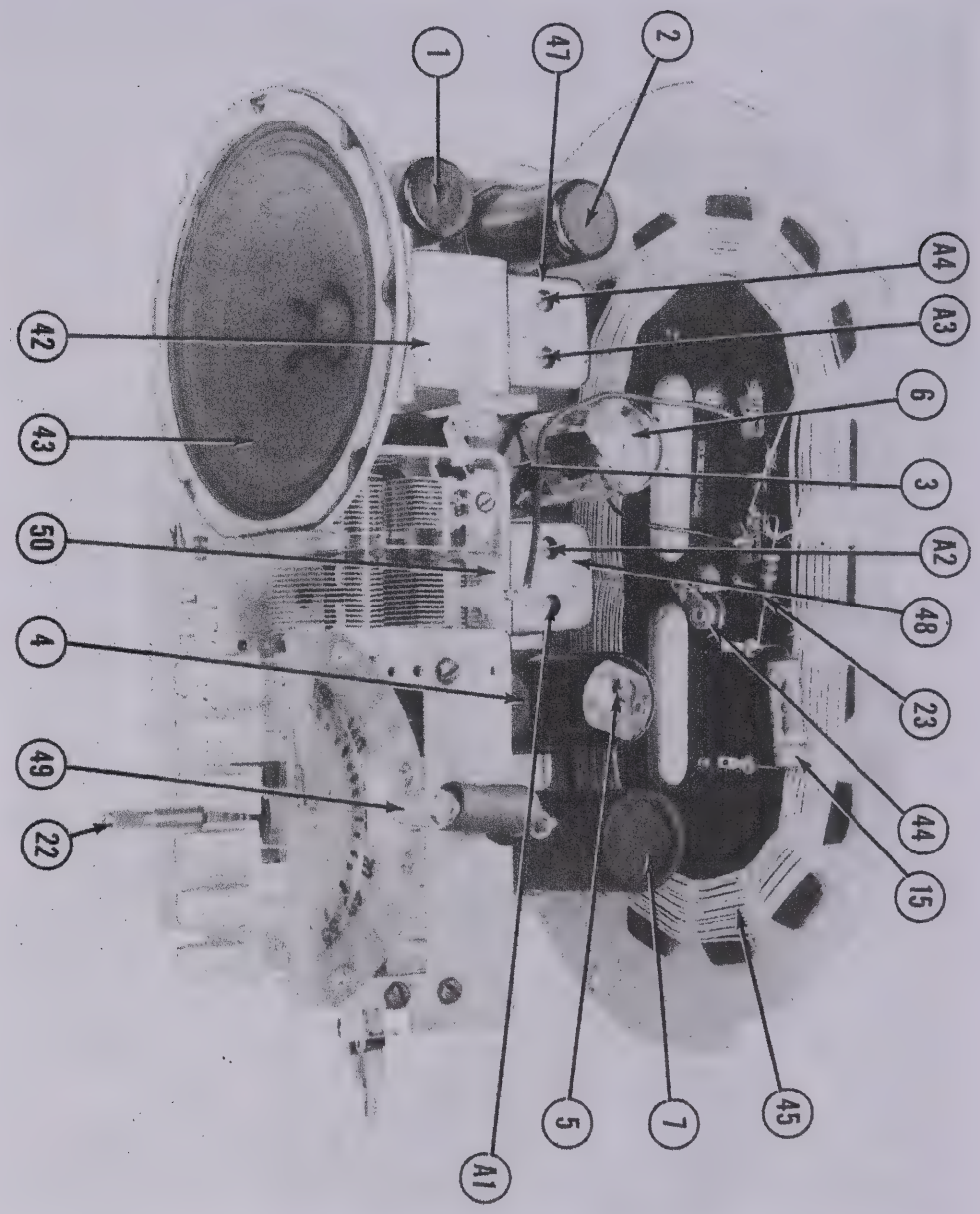
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: BELMONT PART No.	MALLORY PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
22(A)	1 Meg.	1	101218	MK402	D13-137	AM-63-Z	Volume Control
(B)	Shaft		Not Req.	Not Req.	E	KSS-3	Attach to 22A per instructions
(C)	Switch		" "	M26	41	SW-A	" " " " "

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: BELMONT PART No.	IRC PART No.	IDENTIFICATION CODES
23	4700Ω	½	A-9B1-70	BTS-4700	Yl.-Vi.-Red Ant. Loading
24	1 Meg.	½	A-9B1-31	BTS-1 Meg.	Br.-Blk.-Grn. AVC Network
25	100Ω	½	A-9B1-50	BW-½-100	Br.-Blk.-Br. RF Cathode
26	150KΩ	½	A-9B1-26	BTS-150K	Br.-Grn.-Yl. Line Isolating
27	4700Ω	½	A-9B1-17	BTS-4700	Yl.-Vi.-Red RF Plate Load
28	100KΩ	½	A-9B1-25	BTS-100K	Br.-Blk.-Yl. AVC Network
29	47KΩ	½	A-9B1-23	BTS-47K	Yl.-Vi.-Or. Osc. Grid
30	3.3 Meg.	½	A-9B1-34	BTS-3.3 Meg.	Or.-Or.-Grn. AVC Network
31	150Ω	½	A-9B1-52	BW-½-150	Br.-Grn.-Br. IF Cathode
32	47KΩ	½	A-9B1-23	BTS-47A	Yl.-Vi.-Or. Diode Load
33	4.7Meg.	½	A-9B1-35	BTS-4.7 Meg.	Yl.-Vi.-Grn. 1st AF Grid
34	220KΩ	½	A-9B1-27	BTS-220K	Red-Red-Yl. 1st AF Plate Load
35	150Ω	½	A-9B1-52	BW-½-150	Br.-Grn.-Br. Output Cathode
36	470KΩ	½	A-9B1-29	BTS-470K	Yl.-Vi.-Yl. Output Grid
37	200Ω	1	A-9B2-53	BW-1-180	Red-Blk.-Br. Filter
38	1200Ω	1	A-9B2-63	BW-1-1200	Br.-Red-Red Filter
39	22Ω	½	A-9B1-42	BW-½-22	Red-Red-Blk. Rectifier Ballast
40	30Ω	1	C-9B2-44	BW-1-33	Or.-Blk.-Blk. Line Dropping

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		BELMONT PART No.	STANCOR PART No.	THORDAR'N PART No.		
	PRI.	SEC.	PRI.	SEC.					
41	3150Ω	3Ω	275Ω	.58Ω	105104	A-3876‡	T-13842‡		‡Requires one new mounting hole.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			BELMONT PART No.	JENSEN PART No.		
42	FIELD PM	VC IMP. 3Ω	114197	ST-107#		#Cut speaker lip the same as the original speaker.
43	CONE DIA. 44-13/16"	VC DIA. 9/16"	NOT READILY REPLACEABLE-USE COMPLETE SPEAKER UNIT.			

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA		INSTALLATION NOTES
		PRI.	SEC.	BELMONT PART No.	MEISSNER PART No.	
44	Loading Coil	14.5Ω		12310		
45	Loop Ant.	.1Ω	1.5Ω	B-13E-10242		
46	Osc. Coil	1.2Ω	4Ω	A-13D-10215		
47	Input IF	32.5Ω	32.5Ω	108140HR	16-6658	
48	Output IF	25Ω	24Ω	108145R	16-6660	

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					BELMONT PART No.		
49	Bayonet	6-8	0.15	Brown	107249		#47

MISCELLANEOUS

ITEM No.	PART NAME	BELMONT PART No.	NOTES
50	Tuning Cap.	B-2A-10211	Two Gang Tuning Capacitor
	Cabinet	128473-9	Bakelite
	Knob	128496-8	Volume
	Dial Lever	115361	Lever with roller
	Spring	120283	Lever Return Spring

PUSHBUTTON ADJUSTMENTS

The pushbuttons may be used, after proper adjustment, for the automatic tuning of any six selected stations. They may be set up in any order.

1 - Turn on the radio and allow it to warm up.

2 - Select call letters of the six desired stations from the call letter sheets supplied with the receiver.

3 - Insert one call-letter tab in each of the pushbuttons. Press in acetate tab over each call-letter.

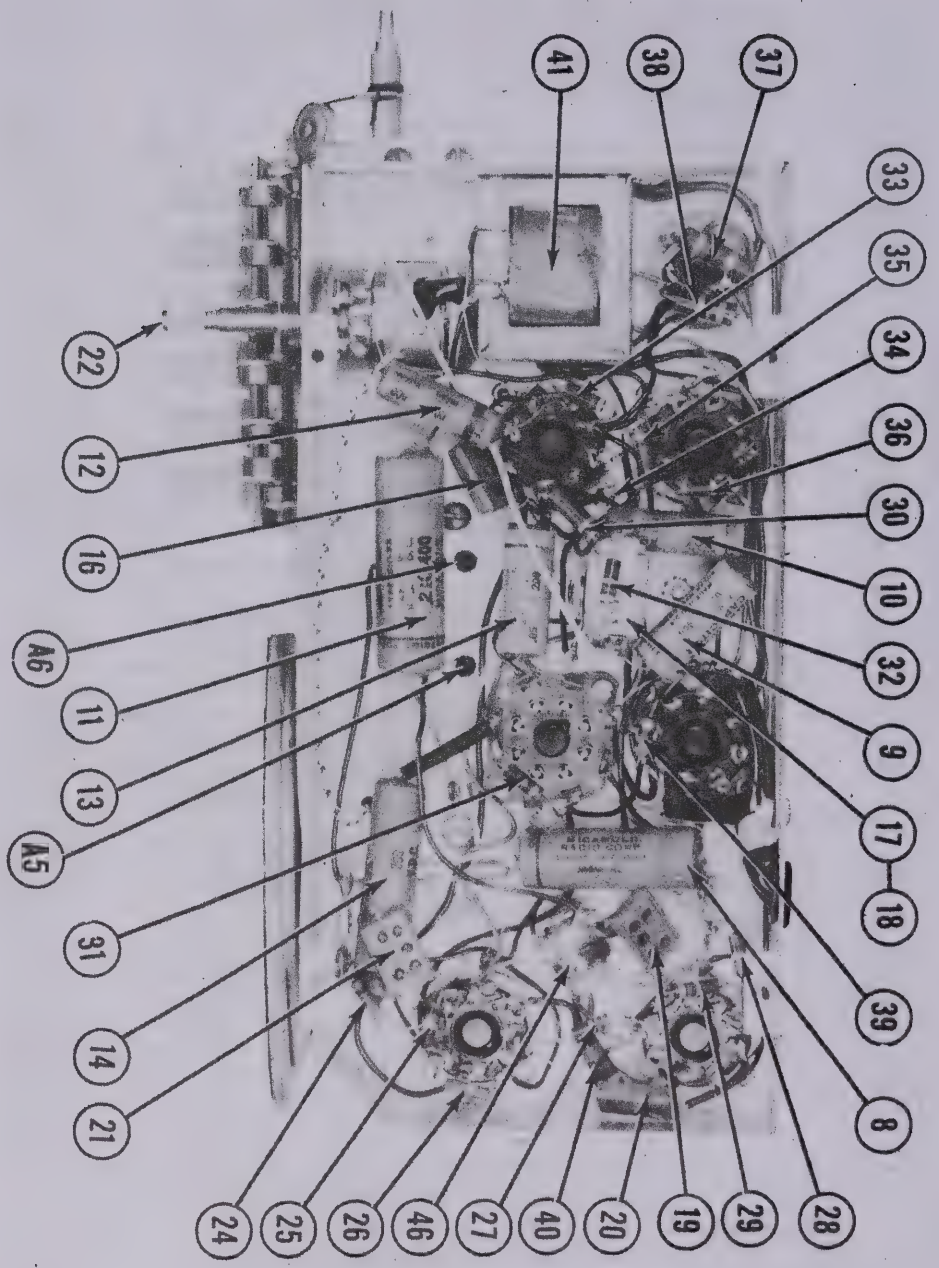
4 - Loosen locking screw in the center of the tuning knob by turning it counterclockwise.

5 - Press the first pushbutton down all the way. Hold down firmly and carefully tune in the station whose call-letters are on the pushbutton. Release the pushbutton.

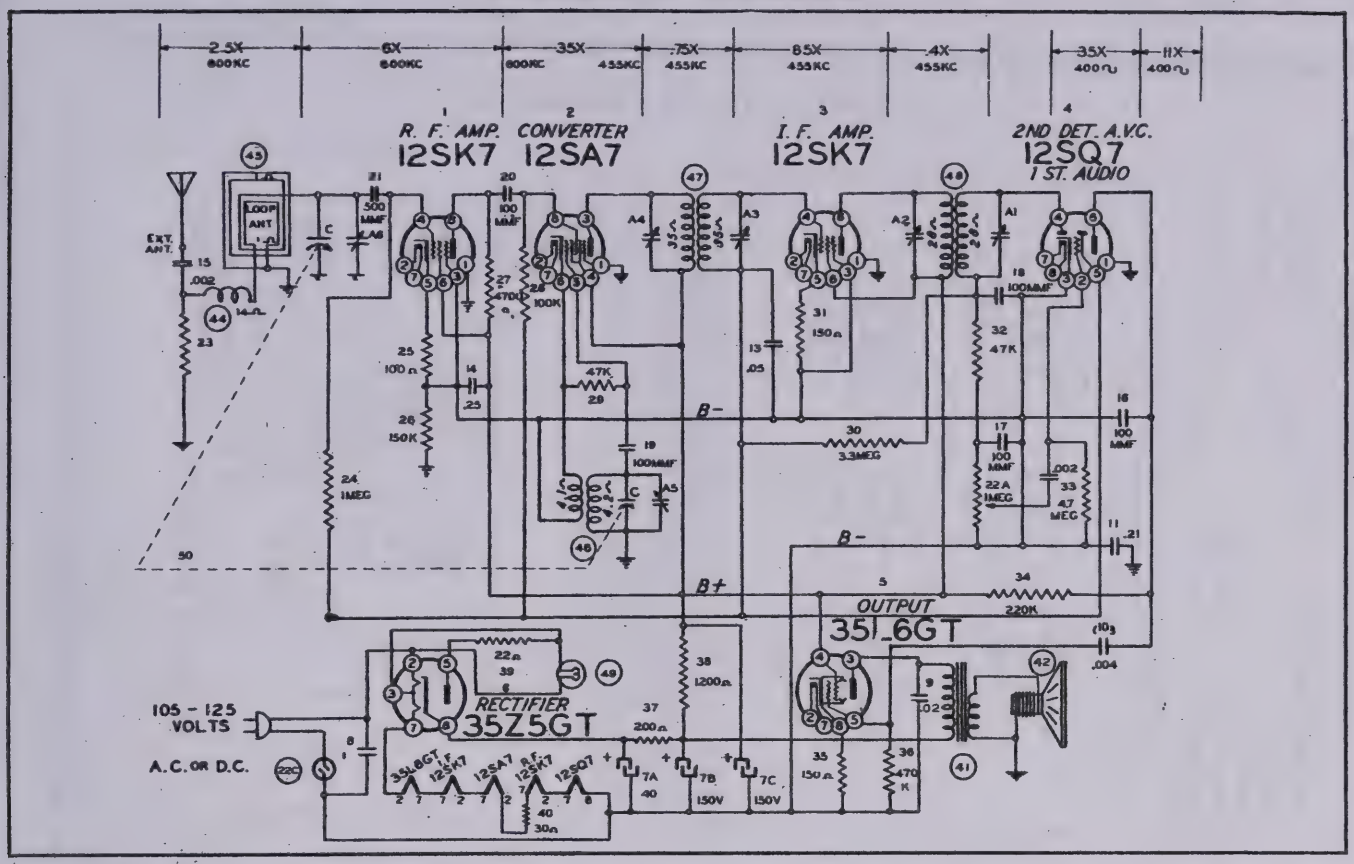
6 - Follow the same proceedure for the other five pushbuttons, adjusting each to a different station as appears on each pushbutton.

7 - Rotate tuning knob on the side of the cabinet as far to the right as it will go. Tighten the locking screw firmly in the center of the tuning knob.

CHASSIS—BOTTOM VIEW

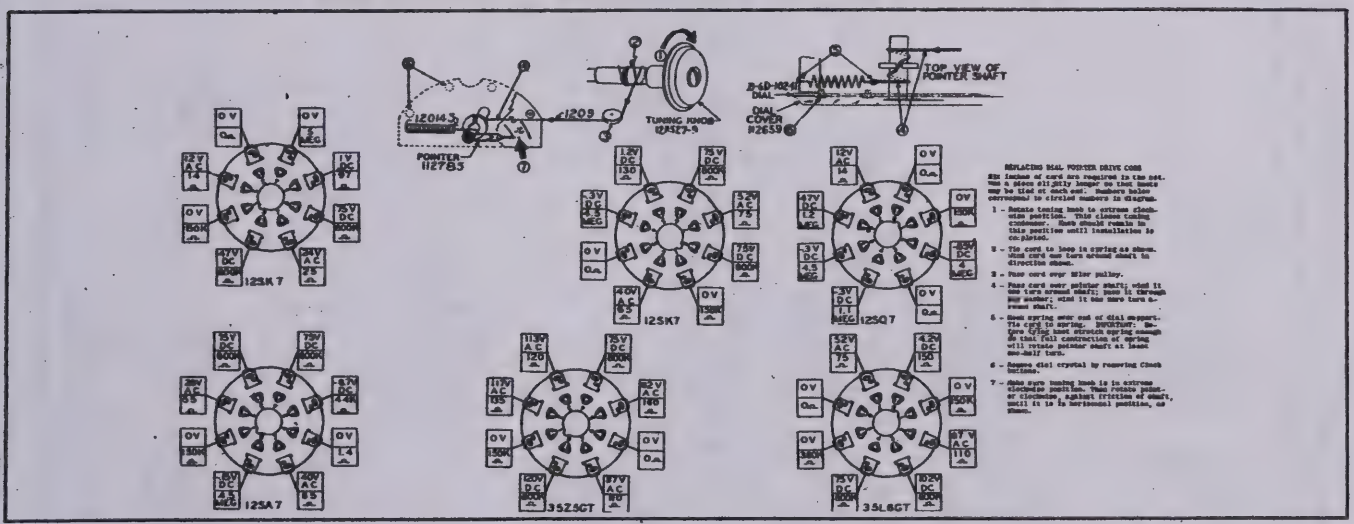


SCHEMATIC DIAGRAM



The stage gain measured values listed above are approximate values for average operative stages, rather than absolute values. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3 volt battery bias substituted for measurement.

VOLTAGE AND RESISTANCE ANALYSIS CHART



1. DC voltage measurements are at 20,000 ohms per volt; AC voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

HOWARD W. SAMS & CO., INC.

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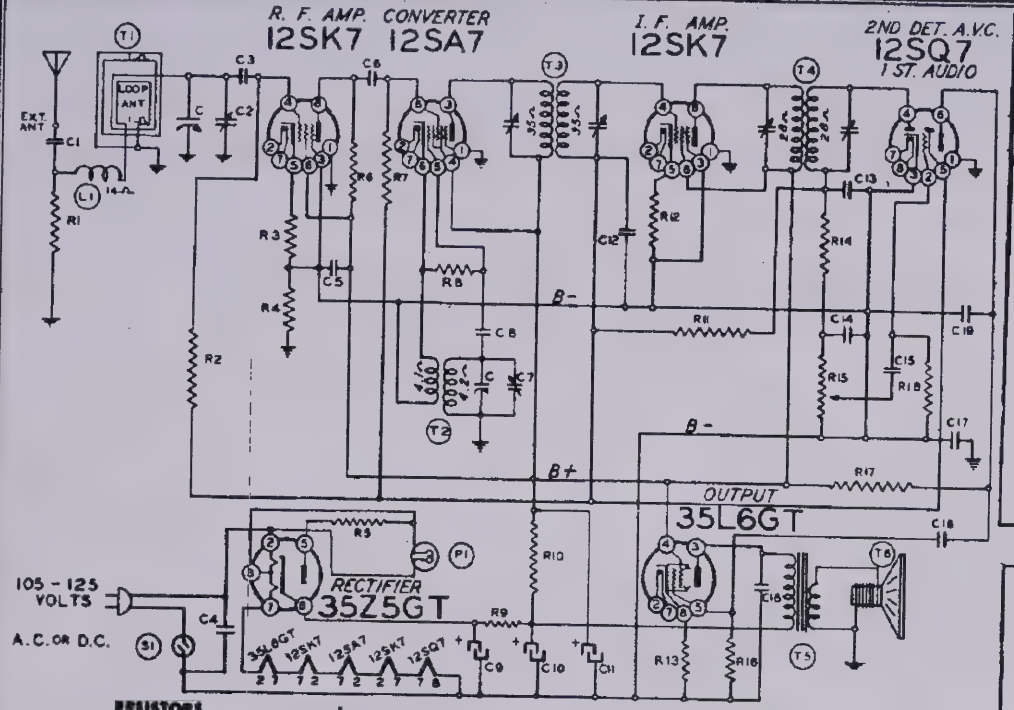
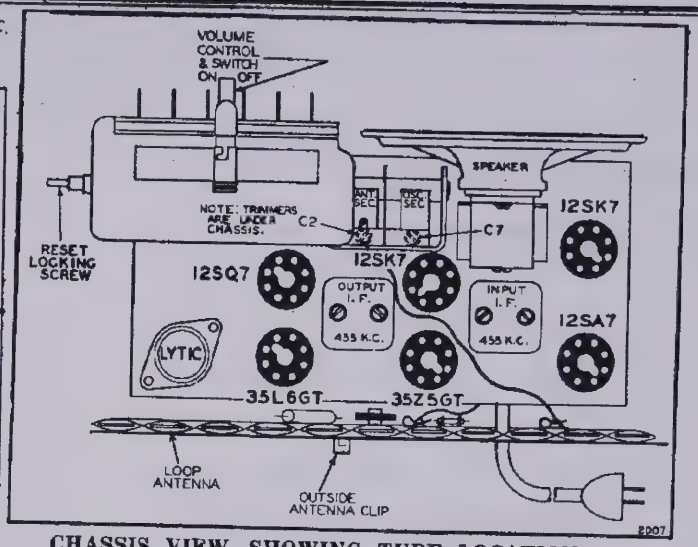
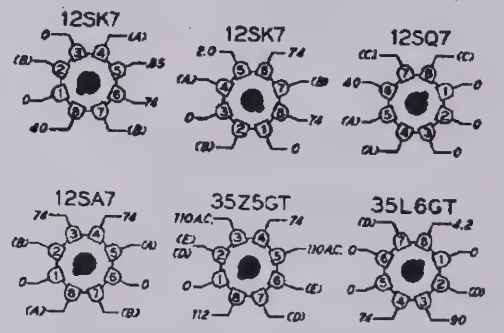




CHASSIS VIEW, SHOWING TUBE LOCATIONS

A-CANNOT BE MEASURED WITH VOLTMETER.
B-12 VOLTS A.C. MEASURED ACROSS PINS 2 & 7.
C-12 VOLTS A.C. MEASURED ACROSS PINS 7 & 8.
D-30 VOLTS A.C. MEASURED ACROSS PINS 2 & 7.
E-117 VOLTS A.C. MEASURED ACROSS PINS 2 & 8.

VOLTAGES MEASURED WITH 1000 OHM PER VOLT VOLTMETER BETWEEN SOCKET TERMINALS & B-. LINE VOLTAGE 117 VOLTS A.C. VOLUME CONTROL AT MINIMUM.



BOTTOM VIEW OF CHASSIS

VOLTAGES AT TUBE SOCKET TERMINALS

RESISTORS

R1	4700 ohms, ½ w., ±10%
R2	1 megohm, ½ w., ±20%
R3	100 ohms, ½ w., ±10%
R4	150,000 ohms, ½ w., ±20%
R5	22 ohms, ½ w., ±10%
R6	4700 ohms, ½ w., ±10%
R7	100,000 ohms, ½ w., ±20%
R8	47,000 ohms, ½ w., ±20%
R9	180 ohms, 1 w., ±10%
R10	1200 ohms, 1 w., ±10%
R11	3.3 megohms, ½ w., ±20%
R12	390 ohms, ½ w., ±10%
R13	150 ohms, ½ w., ±10%
R14	47,000 ohms, ½ w., ±20%
R15	Volume control, 1 megohm
R16	470,000 ohms, ½ w., ±20%
R17	220,000 ohms, ½ w., ±20%
R18	4.7 megohms, ½ w., ±20%

CONDENSERS

C	2 gang variable
C1	.002 x 600 volts
C2	Antenna trimmer on gang
C3	.0005 mica
C4	.1 x 400 volts
C5	.25 x 200 volts
C6	.0001 mica
C7	Oscillator trimmer on gang
C8	.0001 mica
C9	40 mfd lytic x 150 w.v.
C10	20 mfd lytic x 150 w.v.
C11	20 mfd lytic x 150 w.v.

NOTE: C9, C10, C11 are in same unit. In 25-cycle sets, values are 60 mfd., 40 mfd., 40 mfd.

C12	.05 x 200 volts
C13	.0001 mica
C14	.0001 mica
C15	.002 x 400 volts
C16	.02 x 400 volts
C17	.2 x 400 volts
C18	.004 x 600 volts
C19	.0001 mica

MISCELLANEOUS

L1	Loading coil
P1	Pilot light bulb, type T-47
S1	On-off switch on volume control
T1	Loop antenna, complete
T2	Oscillator coil
T3	Input I.F. coil, 455 Kc.
T4	Output I.F. coil, 455 Kc.
T5	Output transformer for speaker
T6	5-inch P.M. speaker

Sensitivity (for 0.05 watt output)..... 10 microvolts average

Intermediate frequency..... 455 Kc.
Power consumption..... 35 Watts

Selectivity..... 55 Kc. broad at 1000 x signal at 1000 Kc.
Power output (in voice coil)
Undistorted..... 0.8 watt
Maximum..... 1.0 watt
Voice coil impedance..... 3.2 ohms

ALIGNMENT PROCEDURE

- No aligning adjustments should be attempted until all other possible causes of trouble have been checked.
- Chassis must be removed from cabinet for proper alignment. Slight adjustments of the oscillator and antenna circuits can be made, without removing the chassis, through two holes provided on the bottom of the cabinet. The two adjustment screws can be reached with a long insulated screwdriver.
- It is important that during alignment the loop antenna be maintained at the same distance from the chassis as when the chassis is installed in the cabinet.
- Turn volume control to maximum for all adjustments.
- Connect ground post of signal generator to B— of radio through a 0.1 mfd. condenser.
- Connect dummy antenna value in series with generator output lead.
- Connect output meter across primary of output transformer.

Band	Signal Generator Frequency Setting	Dummy Antenna	Connection to Radio	Tuning Condenser Setting	Adjust for Maximum Output (see chassis view)
I.F.	455 Kc.	0.1 mfd.	Grid of 12SA7	Rotor full open (plates out of mesh)	4 trimmers on input and output I.F. transformers
Broadcast	1450 Kc.	0.1 mfd.	Grid of 12SA7	Rotor full open (plates out of mesh)	Oscillator trimmer C7 on bottom of radio
	1400 Kc.	None	See note A	Set dial at 1400 Kc.	Antenna trimmer C2 on bottom of radio

Note A: Lay output lead of generator in back of loop antenna. Turn up generator output. Loop antenna will pick up energy.

REPLACEMENT PARTS LIST

When ordering parts, specify part number, schematic symbol when applicable, receiver model number, and series. Use only genuine factory replacement parts.

Part No.	Schematic Symbol	Description
		CONDENSERS
10025	C1, C15	.002 x 600 volts, ±25%
1002	C3	.0005, mica, ±20%
1001	C4	.1 x 400 volts, +50%, −10%
1006	C5	.25 x 200 volts, ±20%
1005	C6, C8, C19	.0001, mica, ±20%
11994	C9, C10, C11	Electrolytic (for 40-cycle sets), 40 mfd. x 150 volts, 20 mfd. x 150 volts, 20 mfd. x 150 volts
11995	C9, C10, C11	Electrolytic (for 25-cycle sets), 60 mfd. x 150 volts, 40 mfd. x 150 volts, 40 mfd. x 150 volts.
1008	C12	.05 x 200 volts, ±25%
125161	C13, C14	Dual .0001, mica, ±10%
10026	C16	.02 x 400 volts, ±25%
106116	C17	.2 x 400 volts, +30%, −10%
106104	C18	.004 x 600 volts, ±10%
		RESISTORS*
A-9B1-70	R1	4700 ohms, ½ watt, ±10%
A-9B1-31	R2	1 megohm, ½ watt, ±20%
A-9B1-50	R3	100 ohms, ½ watt, ±10%
A-9B1-28	R4	150,000 ohms, ½ watt, ±20%
A-9B1-49	R5	22 ohms, ½ watt, ±10%
A-9B1-17	R6	4700 ohms, ½ watt, ±20%
A-9B1-26	R7	100,000 ohms, ½ watt, ±20%
A-9B1-23	R8, R14	47,000 ohms, ½ watt, ±20%
A-9B2-53	R9	180 ohms, 1 watt, ±10%
A-9B2-42	R10	1200 ohms, 1 watt, ±10%
A-9B1-34	R11	3.3 megohms, ½ watt, ±20%
A-9B1-57	R12	390 ohms, ½ watt, ±10%
A-9B1-52	R13	150 ohms, ½ watt, ±10%
A-9B1-29	R16	470,000 ohms, ½ watt, ±20%
A-9B1-27	R17	220,000 ohms, ½ watt, ±20%
A-9B1-36	R18	4.7 megohms, ½ watt, ±20%
		COILS
12310	L1	Load coil
B-12E-10242	T1	Loop antenna assembly, complete on back
A-13D-10215	T2	Oscillator coil
106140	T3	Input I.F. coil in can, 455 Kc.
106145	T4	Output I.F. coil in can, 455 Kc.
		SOCKETS
121210		8-prong octal tube sockets, molded
121171		8-prong socket for 12SK7, laminated
121216		Socket base, bakelite
107271		Pilot light socket assembly
		SPEAKER
114197	T6	5-inch P.M. speaker
106104	T6	Output transformer for speaker
		DIAL PARTS
115448		End plate (right hand bracket)
115449C		End plate (left hand bracket)
115146		Cams

NOTE ON TUBE REPLACEMENT

Replace a defective metal 12SK7 tube with another metal tube. Replace a glass 12SK7 tube with either a metal tube or with an exact duplicate of the tube now in the set.

Part No.	Schematic Symbol	Description
		DIAL PARTS (Contd.)
115143		Key washer (13 used on cam shaft)
117528		Brass spacer (one used on cam shaft
117402		Brass spacer (four used on cam shaft
131181		Spring washers, for locking collar
117404		Locking collar
117302		Brass spacer (next to locking collar)
115592		Key washer (holds drive cord on end of tuner shaft)
117600		Lever shaft
115261		Lever with roller
120283		Return spring for levers
115449B		Dial bracket assembly
118785		Pointer
1209		Drive cord, 8 inches used
120143		Take-up spring for drive cord
B-8D-10241		Dial scale
113659		Crystal, clear, for dial scale
A-2M-7758		Cinch buttons for fastening scale to bracket
117566-1		Brass spacer (at end of tuner shaft)
117833		Brass spacer (for spacing pointer from dial)
		MISCELLANEOUS
10798		Line cord and plug
101218	R15	Volume control and switch, 1 megohm
B-8A-10211	C	2-gang variable condenser
107249	P1	Pilot light bulb, type T-47
122108		Chassis screws, No. 6 x ⅛" hex. head
134123		Rubber bumper (bottom of cabinet)
128495		Cardboard back, brown
128495B		Cardboard back, ivory
131192		Cinch buttons, for fastening back to cabinet
13141		Cinch buttons, to cover trimmer holes in cabinet
128292-17		Pushbuttons, walnut
128292-8		Pushbuttons, ivory
112784		Station call letters, set
113606		Acetate tabs for call letters
128473-18		Cabinet, bakelite, walnut
128473-9		Cabinet, bakelite, ivory
128496-17		Knob, volume, walnut
128496-8		Knob, volume, ivory
128527-18		Knob, tuning, walnut
128527-9		Knob, tuning, ivory
117434		Locking screw for tuning knob. (Specify walnut or ivory.)
130838		Locking spring for tuning knob

REPLACING DIAL POINTER DRIVE CORD

Six inches of cord are required in the set. Use a piece slightly longer so that knots may be tied at each end. Numbers below correspond to circled numbers in diagram.

1. Rotate tuning knob to extreme clockwise position. This closes tuning condenser. Knob should remain in this position until installation is completed.

2. Tie knot at one end of cord and place it in key washer as shown. Wind cord one turn around shaft in direction shown.

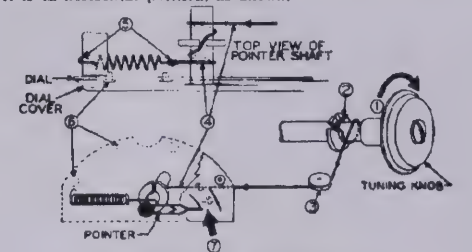
3. Pass cord over idler pulley.

4. Pass cord over pointer shaft; wind it one turn around shaft; pass it through key washer; wind it one more turn around shaft.

5. Hook spring over end of dial support. Tie cord to spring. IMPORTANT: Before tying knot stretch spring enough so that full contraction of spring will rotate pointer shaft at least one-half turn.

6. Remove dial crystal by removing Cinch buttons.

7. Make sure tuning knob is in extreme clockwise position. Then rotate pointer clockwise, against friction of shaft, until it is in horizontal position, as shown.



SETTING THE PUSHBUTTONS

The pushbuttons may be used, after proper adjustment, for the automatic tuning of any six stations which you select. They can be set up in any order.

1. Turn on the radio. Allow it to warm up for at least one minute.

2. Push out the call letters of the six stations from the call-letter sheets supplied with this manual. Press an acetate tab (supplied in small envelope) into each of the pushbuttons.

3. Insert one call-letter tab in the rectangular opening in each of the pushbuttons, in any sequence.

4. Check to see that the locking screw in the center of the tuning knob (see illustration) is loose. If it is not, turn it several turns to the left (counterclockwise). A coin may be used for this purpose.

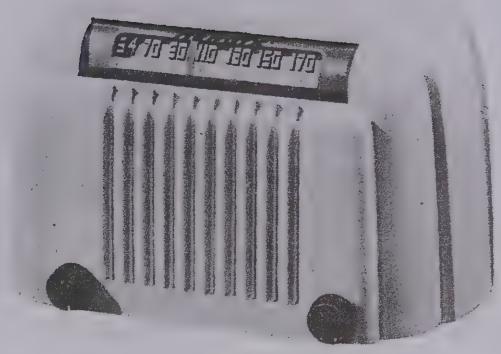
5. Press the first pushbutton down all the way. With one hand hold the button down firmly and with the other carefully tune in the desired station. Release the pushbutton.

6. Follow this procedure for each of the five other buttons, adjusting each one for a different station.

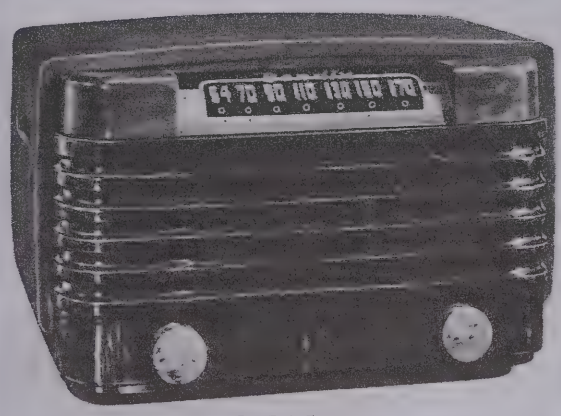
7. Rotate the tuning knob on the side of the cabinet as far to the right as it will go. Tighten the locking screw in the center of the knob. IT IS IMPORTANT THAT THIS SCREW BE TIGHTENED VERY FIRMLY.

5-6 1630 1810 6caps restore sphr 1.75
5-7 1130 1? 4caps 1 tube + align 2
3.75
187.5

0526A



0526B



0526C

0526E

BENDIX MODEL 0526A

TRADE NAME	Bendix, Models 0526A, 0526B, 0526C, 0526D, 0526E
MANUFACTURER	Bendix Radio Division, Bendix Aviation Corp. - Baltimore 4, Maryland
TYPE SET	AC - DC Superheterodyne - Self Contained Loop Antenna
TUBES (FIVE)	Types 12SA7 Converter, 12SK7 IF Amp., 12SQ7 Demod. 1st AF, 50L6GT Power Output, 35Z5GT Rectifier.
POWER SUPPLY	105-125 Volts AC-DC Rating .235 Amp. @ 117 Volts AC
TUNING RANGE--BROADCAST	535-1725KC SHORT WAVE

ALIGNMENT INSTRUCTIONS

DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
.05MFD.	High side to external ant. post Low to chassis.	455KC	High end of band.	Across voice coil.	A1, A2, A3, A4.	Adjust for maximum output. See Note A.
	Loop	1550KC	1550KC Mark.	"	A5	Adjust for maximum output. See Note B.
	"	"	"	"	A6	" "
	"	580KC	580KC Mark.	"		Check for sensitivity and calibration.

Note A - Use isolation transformer if available. If not, isolating capacitor must be connected between signal generator ground lead and receiver chassis. Also decrease dummy ant. to .001 MFD to prevent excessive hum modulation.

Note B - Connect signal generator output to loop of few turns of wire and radiate signal to receiver loop by spacing (no direct connection). It may be necessary to "rock" gang slightly while adjusting A6.

Check dial calibration with following information. With tuning capacitor in full mesh dial pointer should be 2" from left end of dial back plate. At 580KC dial pointer is 2½" from left end of dial back plate. At 1550KC dial pointer is 5-15/32" from left end of dial back plate. Strip of paper may be clipped on dial back plate for positioning marks.

Volume control at maximum volume and output from signal generator no higher than necessary to give output reading. Use insulated alignment screwdriver. On models 0526A, 0526B and 0526F metal plate should be in place on bottom of chassis.

BENDIX
MODEL 0526 SERIES

BENDIX
MODEL 0526 SERIES

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	REPLACEMENT DATA: BENDIX PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	Converter	12SA7	12SA7	8R	
2	IF Amp.	12SK7	12SK7	8N	
3	Demod.-1AF	12SQ7	12SQ7	8Q	
4	Power Output	50L6GT	50L6GT	7AC	
5	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: BENDIX PART No.	MALLORY PART No.	SOLAR PART No.	SPRAGUE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
6(A)	40	150	CE2A00	FP214	DY-2x50-150	EL-25	AF88D	UP8BJ34	■ Filter
(B)	40	150							▲
7	.05	600	CP6T40	TP415	S-6-05	TC-15	684-.05	DT6S5	Line Bypass
8	.1	400	CP4T51	TP428	S-4-1	TC-1	484-.1	DT4P1	Line Isolating
9	.01	400	CP4T31	TP421	S-4-01	TC-11	484-.01	BT4S1	50L6 Plate Bypass
10	.004	600	CP6T16	TP407	S-6-004	TC-24	684-.004	DT6D4	Ant. Coupling
11	.004	600	CP6T16	TP407	S-6-004	TC-24	684-.004	DT6D4	Audio Coupling
12	.05	400	CP4T40	TP426	S-4-05	TC-15	484-.05	DT4S5	AVC Filter
13	6000	300	CP4T20	MC467	MW.5-26	1FM-26	1467-.006	1D5D6	Audio Coupling
14	330	500	CM5A34	MC243	MO.5-34	1FM-34	1468-.0004	5W5T4	Audio Plate Bypass
15	47	500	CM5A14	MC225	MO.5-45	1FM-45	1468-.00005	5W5Q5	Osc. Grid Cond.
16	1000	500	CM5A46	MC255	MO.3-21	1FM-21	1468-.001	1W5D1	Audio Plate Bypass

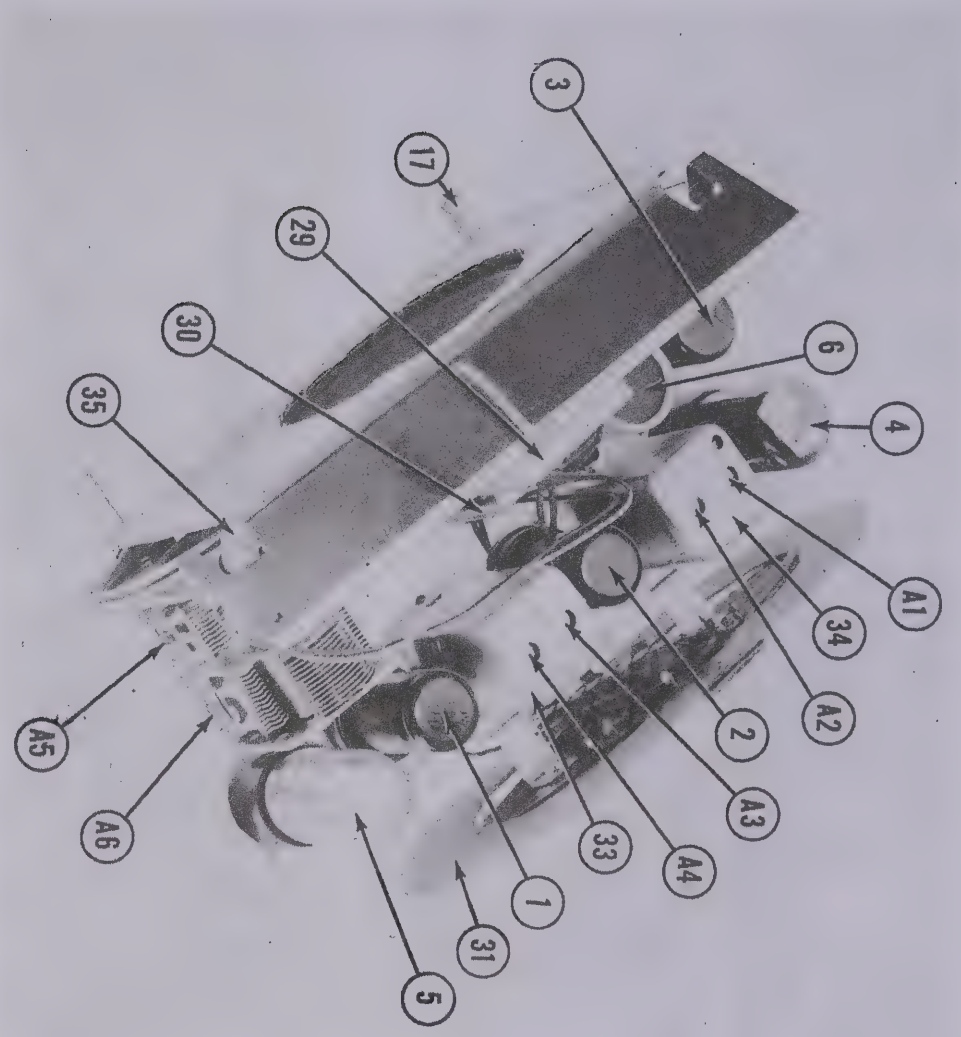
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: BENDIX PART No.	MALLORY PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
17(A)	500Kᘯ	1	RV0800	*MR48	*D13-133	*M-60-Z	**See Inst. Note 1.
(B)			Not Req.	Not Req.	A	Not Req.	Attach to 17A per instructions
(C)	Switch		" "	M26	41	SW-A	" " " "
	Inst.	Note 1	- Install a 50Kᘯ resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control. (Control viewed from shaft side, terminals down.)				

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: BENDIX PART No.	IRC PART No.	IDENTIFICATION CODES
18	15 Meg.	½	RC1H76	BTS-15 Meg.	Br.-Grn.-Blue AVC Network
19	22Kᘯ	½	RC1H40	BTS-22K	Red-Red-Or. Osc. Grid
20	3.3 Meg.	½	RC1H68	BTS-3.3 Meg.	Or.-Or.-Grn. AVC Network
21	220Kᘯ	½	RC1H54	BTS-220K	Red-Red-Yl. Plate Load
22	4.7 Meg.	½	RC1H70	BTS-4.7 Meg.	Yl.-Vi.-Grn. 1st AF Grid
23	470Kᘯ	½	RC1H58	BTS-470K	Yl.-Vi.-Yl. Output Grid
24	150ᘯ	1	RW1B14	BW-1-150	Br.-Grn.-Br. Output Cathode
25	2200ᘯ	2	RC4G28	BT-2-2200	Red-Red-Red Filter
26	100ᘯ	1	RC3H12	BW-1-100	Br.-Blk.-Br. Pilot Light Ballast
27	33ᘯ	1	RW1A06	BW-1-33	Or.-Or.-Blk. Rectifier Ballast
28	220K	½	RC1H54	BTS-220K	Red-Red-Yl. Line Isolating

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS

TRANSFORMER (OUTPUT)

ITEM No.	RATING IMPEDANCE PRI.	RATING IMPEDANCE SEC.	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA BENDIX PART No.	STANCOR PART No.	THORDAR'N PART No.	UTAH PART No.	INSTALLATION NOTES
29	1540Ω	3.2Ω	142Ω	.5Ω	TA0000	A3865†	T-14882‡	8775‡	‡Bend mounting tabs down and mount by original bracket. †Mounting bracket must be improvised.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA BENDIX PART No.	JENSEN PART No.	UTAH PART No.	INSTALLATION NOTES
30	FIELD RES. PM	VC IMP. 3.2Ω	SP4R00	ST-113*	4PY*	Reglue baffle to replacement speaker. *Mounting bracket must be improvised.
	CONE DIA.	VC DIA.				
	4"	⅛"	CS4R00	None	None	Use with SP4R00 (Code 252)
	"	"	CS4R01	"	"	" " " (Code 328)
	"	"	CS4R02	"	"	" " " (Code 277)
	"	"	CS4R03	"	"	" " " (Code 258)
	"	"	CS4R04	"	"	" " " (Code 191)

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA BENDIX PART No.	REPLACEMENT DATA MEISSNER PART No.	INSTALLATION NOTES
31	Loop Ant.	0	.5Ω	AL0C00		
32	Osc.	.5	4.8Ω	L02B00		
33	Input IF	24Ω	24Ω	T10C00	16-6658	
34	Output IF	26Ω	25Ω	T10D00		

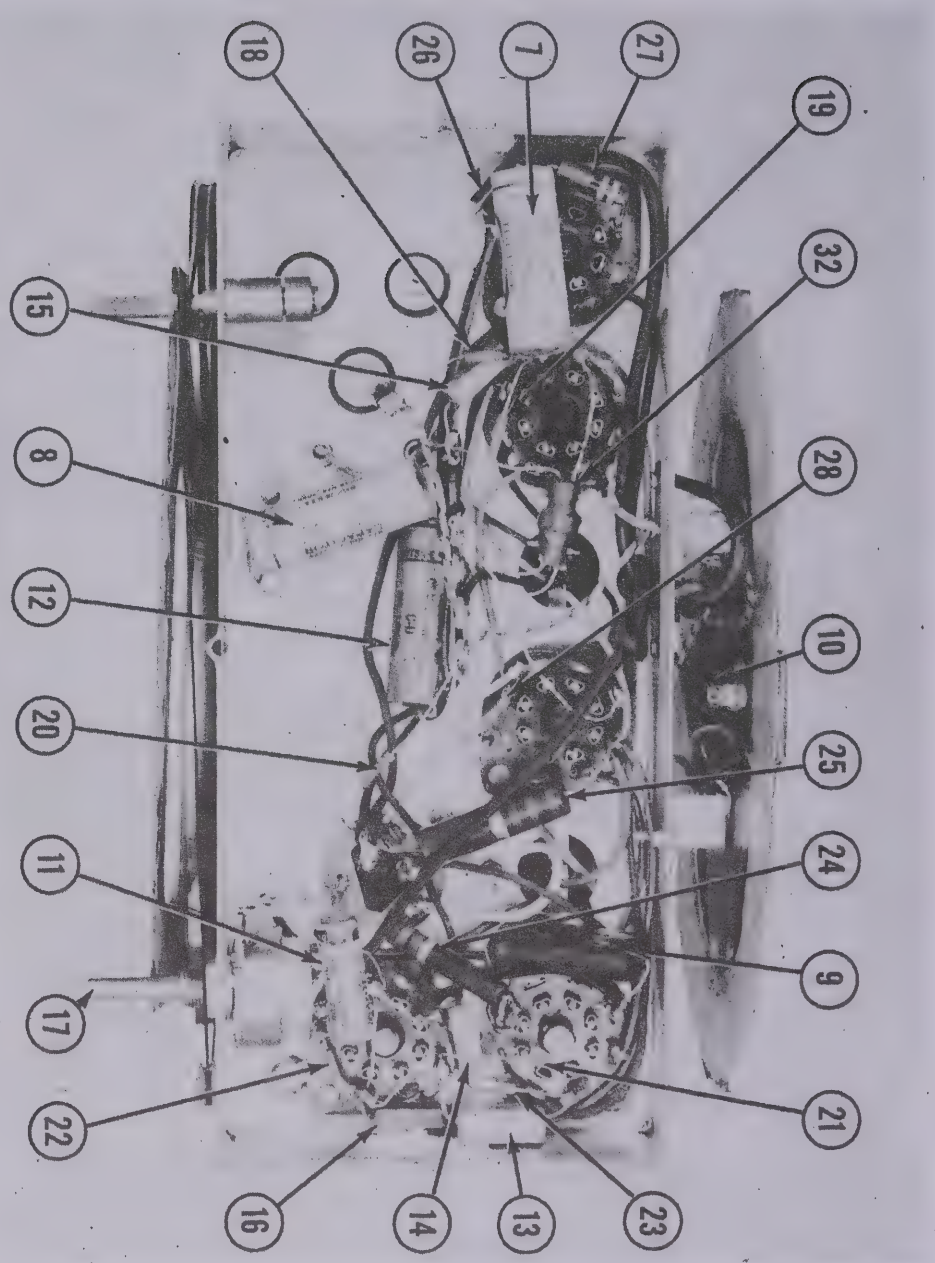
DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA BENDIX PART No.		INSTALLATION NOTES
35	Min. Bayonet	6-8	0.15	Brown			#47

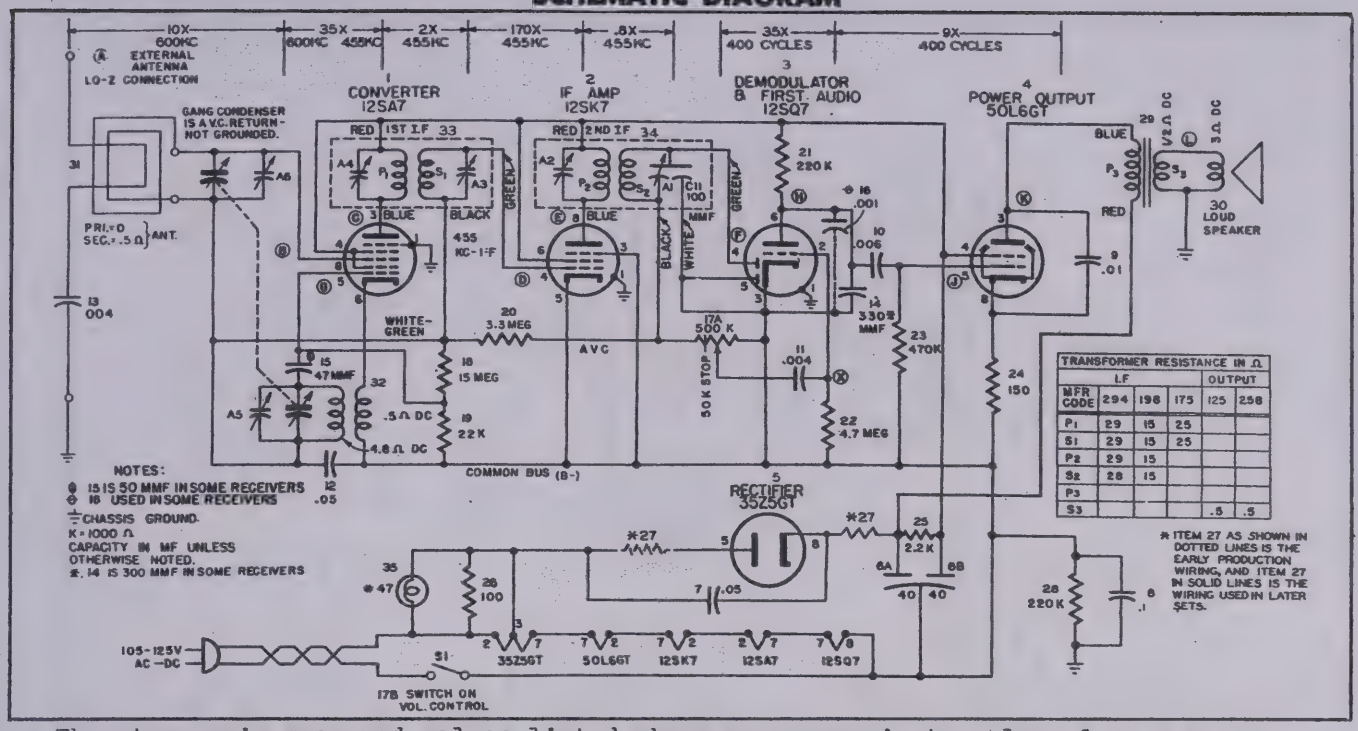
MISCELLANEOUS

ITEM No.	PART NAME	BENDIX PART No.	NOTES
A5	Trimmer		Part of CV0B01
A6	"		" " "
	Tuning Cap.	CV0B01	2 gang variable tuning capacitor
	Knob	KC0B01	0526A
	"	KC0B03	0526B
	"	KC0G00	0526C
	"	KC0G01	0526D
	"	KC0B02	0526E
	Dial Scale	DS0A03	0526A, 0526B (Plastic)
	" "	DS0A00	0526C (Glass)
	" "	DS0A05	0526D "
	" "	DS0A07	0526E

CHASSIS—BOTTOM VIEW



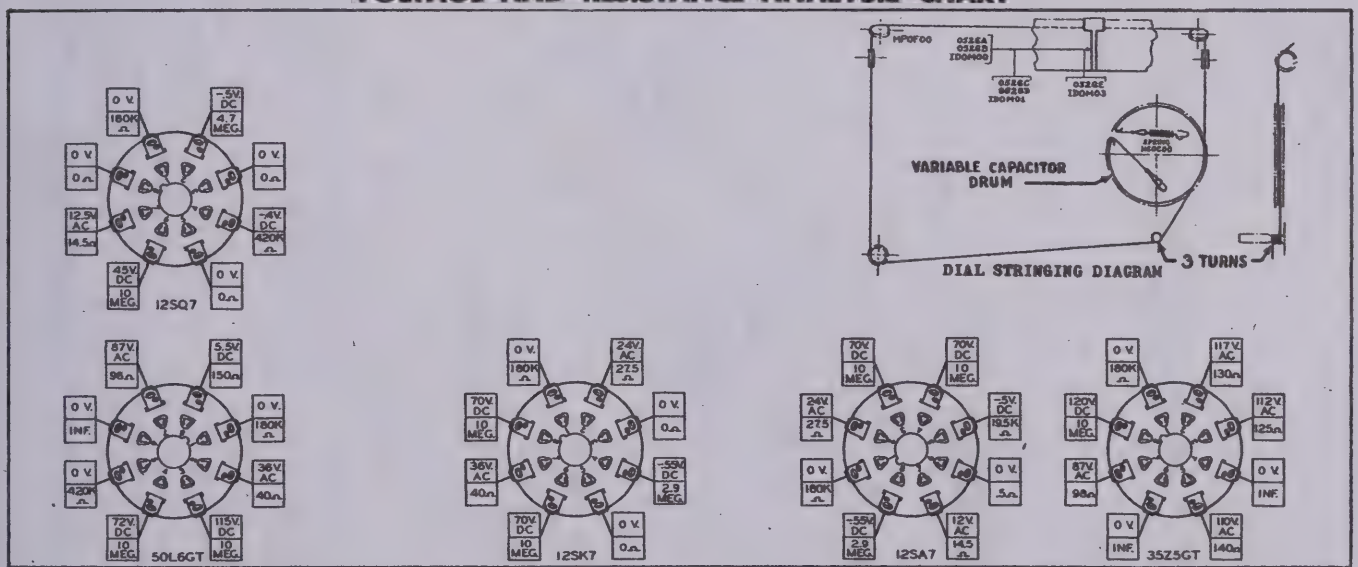
SCHEMATIC DIAGRAM


10X 600KC
35X 600KC 455KC
2X 455KC
170X 455KC
.8X 455KC
35X 400 CYCLES
9X 400 CYCLES
A EXTERNAL ANTENNA LO-Z CONNECTION
1 CONVERTER 12SA7
2 IF AMP 12SK7
3 DEMODULATOR & FIRST AUDIO 12SQ7
4 POWER OUTPUT 50L6GT
GANG CONDENSER IS A.V.C. RETURN - NOT GROUNDED.
RED 1ST I.F. 33
RED 2ND I.F. 34
PRI. = 0 SEC. = .5 Ω ANT.
455 KC - I.F.
WHITE-GREEN
AVC
50 K STOP
COMMON BUS (B-)
5 RECTIFIER 35Z5GT
105-125V AC-DC
S1 178 SWITCH ON VOL. CONTROL
30 LOUD SPEAKER
TRANSFORMER RESISTANCE IN Ω
NOTES:
◆ 15 IS 50 MMF IN SOME RECEIVERS
◆ 16 USED IN SOME RECEIVERS
CHASSIS GROUND.
K = 1000 Ω
CAPACITY IN MF UNLESS OTHERWISE NOTED.
± .14 IS 300 MMF IN SOME RECEIVERS
* ITEM 27 AS SHOWN IN DOTTED LINES IS THE EARLY PRODUCTION WIRING, AND ITEM 27 IN SOLID LINES IS THE WIRING USED IN LATER SETS.

TRANSFORMER RESISTANCE IN Ω					
	I.F.			OUTPUT	
MFR CODE	294	198	175	125	258
P1	29	15	25		
S1	29	15	25		
P2	29	15			
S2	28	15			
P3					
S3				.5	.5

The stage gain measured values listed above are approximate values for an average operative stage, rather than an absolute value. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3-volt Battery bias substituted for measurement.

VOLTAGE AND RESISTANCE ANALYSIS CHART



1 - DC Voltage measurements are at 20,000 ohms per volt: AC Voltages measured at 1000 ohms per volt.

2 - Socket connections are shown as bottom views.

3 - Measured values are from socket pin to common negative.

4 - Line voltage maintained at 117 volts for voltage readings.

5 - Nominal tolerance on component values makes possible a variation of + 10% in voltage and resistance readings.

6 - Volume control at maximum, no signal applied for voltage measurements.

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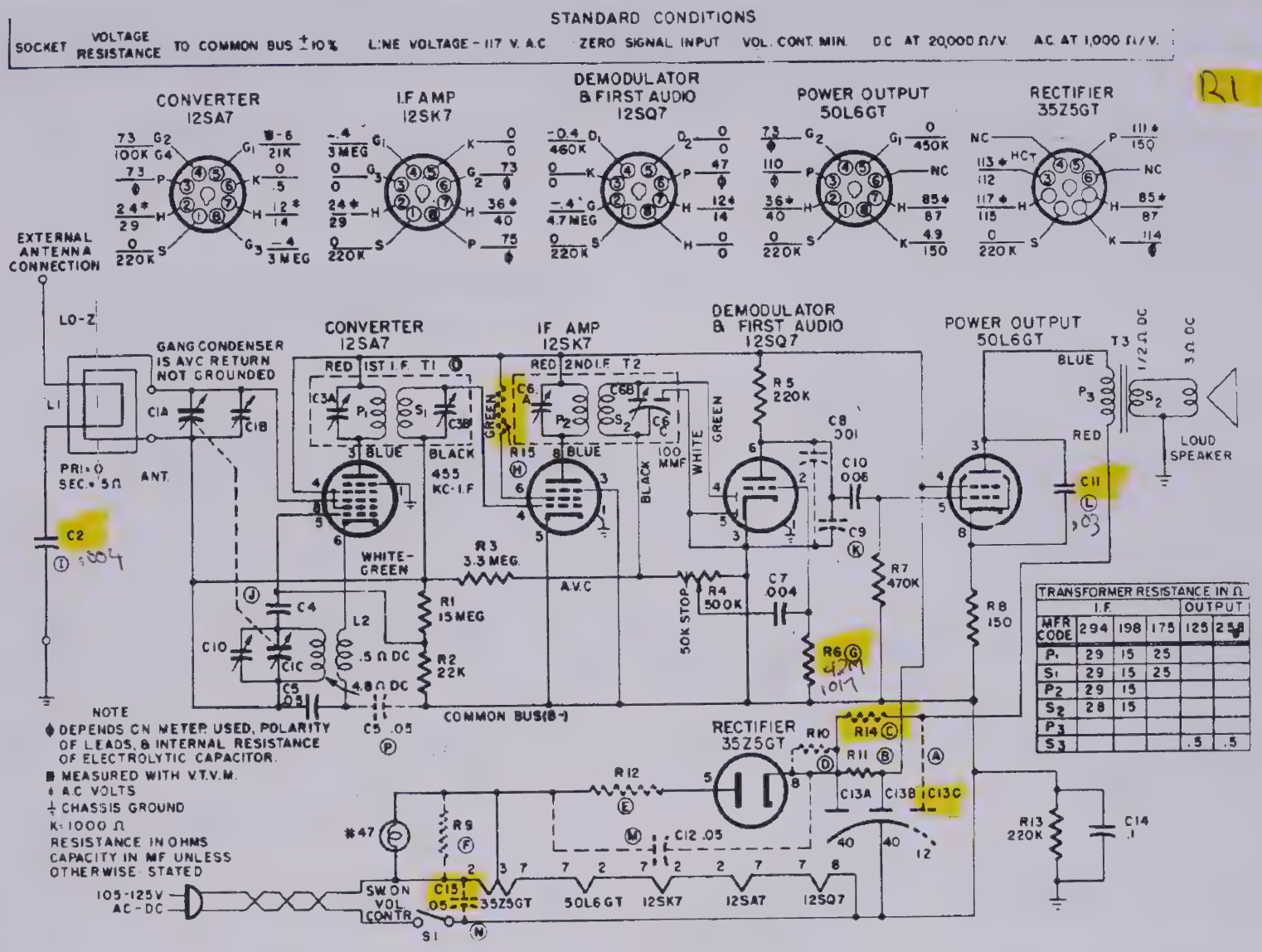


Fig. 8 Schematic Diagram Model 526

© John F Rider

CIRCUIT FOOTNOTES

The Schematic Diagram, Fig. 8, combines the two similar chassis O-1 and R-1. Where differences occur, changes are noted on the diagram by dotted lines, and a letter beside each circuit element involved indicates the corresponding footnote.

A. Capacitor C13a, b (40-40 mfd) is found in O-1 chassis. Capacitor C13a, b, c (40-40-12 mfd) is found in R-1 chassis.

B. R11 is 2200 ohms in O-1 chassis and 1500 ohms in R-1 chassis.

C. R14 (230 ohms) is used in R-1 chassis, not in O-1 chassis.

D. R10 (33 ohms) is not used in R-1 chassis.

E. R12 (33 ohms) is not used in R-1 chassis.

F. R9 (100 ohms) is not used in R-1 chassis.

G. R6 is 4.7 meg in O-1 chassis, but may be either 4.7 or 10 meg in R-1 chassis.

H. R15 (33 ohms) is not used in O-1 chassis.

I. C2 is .004 mfd in R-1 chassis, but may be .004 mfd or 470 mmf in O-1 chassis.

J. C4 (47 mmf) is 50 mmf in some receivers.

K. C9 may be either 300 mmf or 330 mmf in O-1 chassis. It is not used in R-1 chassis.

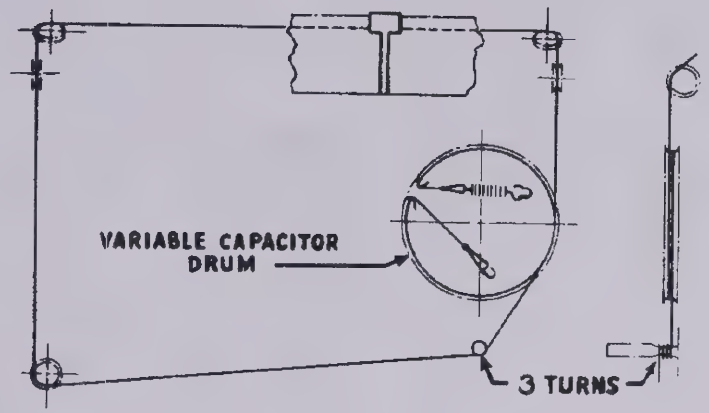
L. C11 is .01 mfd in O-1 chassis and .03 mfd in R-1 chassis.

M. C12 (.05 mfd) is used in O-1 chassis, not in R-1 chassis.

N. C15 (.05 mfd) is used in R-1 chassis, not in O-1 chassis.

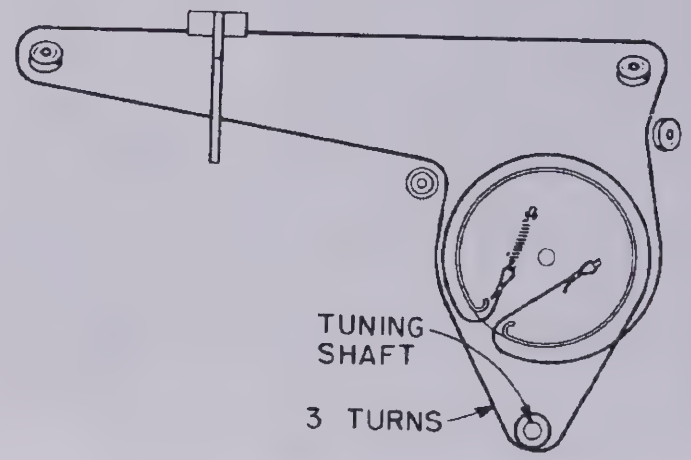
O. In R-1 chassis only, T1 may be a "K" transformer in some units.

P. In some units of R-1 chassis only, C5 (.05 mfd) may be connected between the untuned winding of L2 and the lower end of R2.



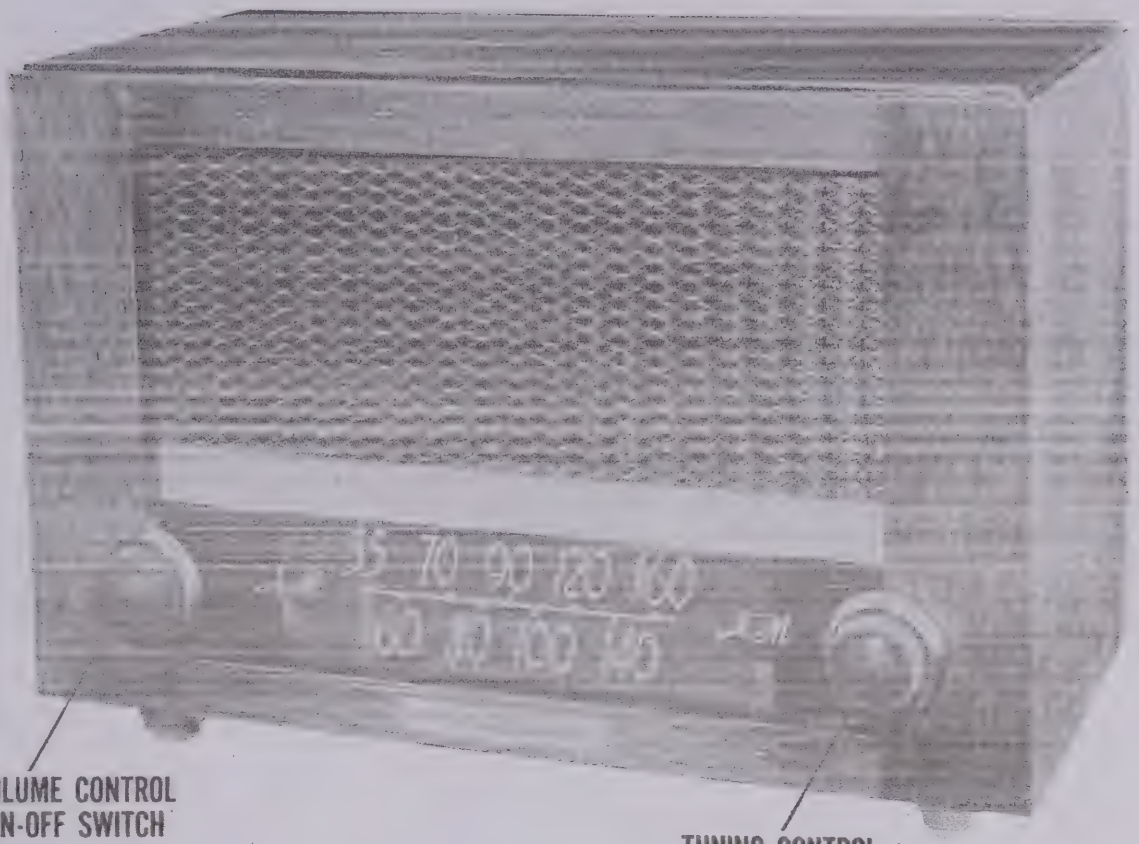
FRONT VIEW

Dial Stringing Diagram
Model O526



Dial Stringing Diagram
Model 526

GENERAL ELECTRIC
MODELS 404, 405, 410



GENERAL ELECTRIC
MODELS 404, 405, 410

GENERAL ELECTRIC MODEL 410

TRADE NAME	General Electric, Models 404, 405, 410
MANUFACTURER	General Electric Co., Electronics Dept., Electronics Park, Syracuse, New York
TYPE SET	AC-DC Operated Superheterodyne Receiver With Loop Antenna
TUBES (SIX)	Types 12SK7 RF Amp., 12SA7 Converter, 12BA6 IF Amp., 12SQ7 Det.-AVC-AF, 35L6GT Power Output 35Z5GT Rectifier
POWER SUPPLY	.24 Amp. @ 117 Volts AC — RATING .24 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning gang fully closed and set pointer 1 7/8 inches to the right of the left hand end of the metal portion of the dial backplate.
Use isolation transformer if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
.5MFD	High side to stator on front section of tuning gang. Low side to B-	455KC (400 ~ Mod.)	Tuning gang fully open	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
	[illegible]	1620KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
	Loop	[illegible]	Tune for max.		A6, A7	

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	G. E.	STANDARD	RMA BASE TYPE	INSTALLATION NOTES
V1	RF Amp.	6SK7		6N	
V2	Converter	6SA7		6R	
V3	IF Amp.	6BA6	6BA6	7BK	
V4	Det., AVC & A	6SQ7		6Q	
V5	Power Output	35L6GT	35L6GT	7AC	
V6	Rectifier	35Z5GT	35Z5GT	5AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						IDENTIFICATION CODES AND INSTALLATION NOTES
	D.C.	VOLTS	G. E. PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	
C1 A	30	150				SD1.5		TVL-2	
B	50	150							Filter Yellow
C2	.01	400	UCC-045	P488-05	DF-503	PTE4S5		4TM-S5	AVC Filter
C3	2.2		RCN-039	S13NPO	TCZ-2.2		NPOK-3		RF Coupling
C4	.02	400	UCC-041	P488-02	DF-203	PTE4S2		4TM-S2	Tuning Cap. Isolation
C5	.05	400	UCC-044	P488-04	DF-503	PTE4S4		4TM-S4	RF Bypass
C6	47	50	UCU-020	1458-00005	DS-470	5W5Q5	GP1K-47	1FM-45	Osc. Grid Cap
C7	.05	200	UCC-045	P488-05	DF-503	PTE4S5		4TM-S5	RF Bypass
C8 A	3500		RGW-3036	EPD-004	DD-502	PTE6D4	GP2M-004	29C18	Audio Coupling
B	220			S12S0	DS-221	5W5T25	GP2K-220	19C13	AF Amp. Plate
C	5000			EPD-005	DD-502	PTE6D5	811-005	29C1	Audio Coupling
C9	.02	600	UCC-041	P668-02	DF-203	PTE6S2		6TM-S2	Output Plate Bypass
C10	.05	400	UCC-045	P488-05	DF-503	PTE4S5		4TM-S5	
C11	.01	400	UCC-045	P488-05	DF-503	PTE4S5		72P51	Line Isolation
C12	.1	400	UCC-045	P668-05	DF-503	PTE6S5		6TM-S5	Line Filter

CONTROLS

ITEM No.	RATING	REPLACEMENT DATA				INSTALLATION NOTES
		G. E. PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	
R1A	1.0 MΩ	-19	Q3-.33 *			Volume control
B	1.0 MΩ	-1	73-			Attach to R1A per instructions

* Slip dial cord pully over shaft of replacement control then wrap scotch tape around shaft to hold pully in place.

RESISTORS

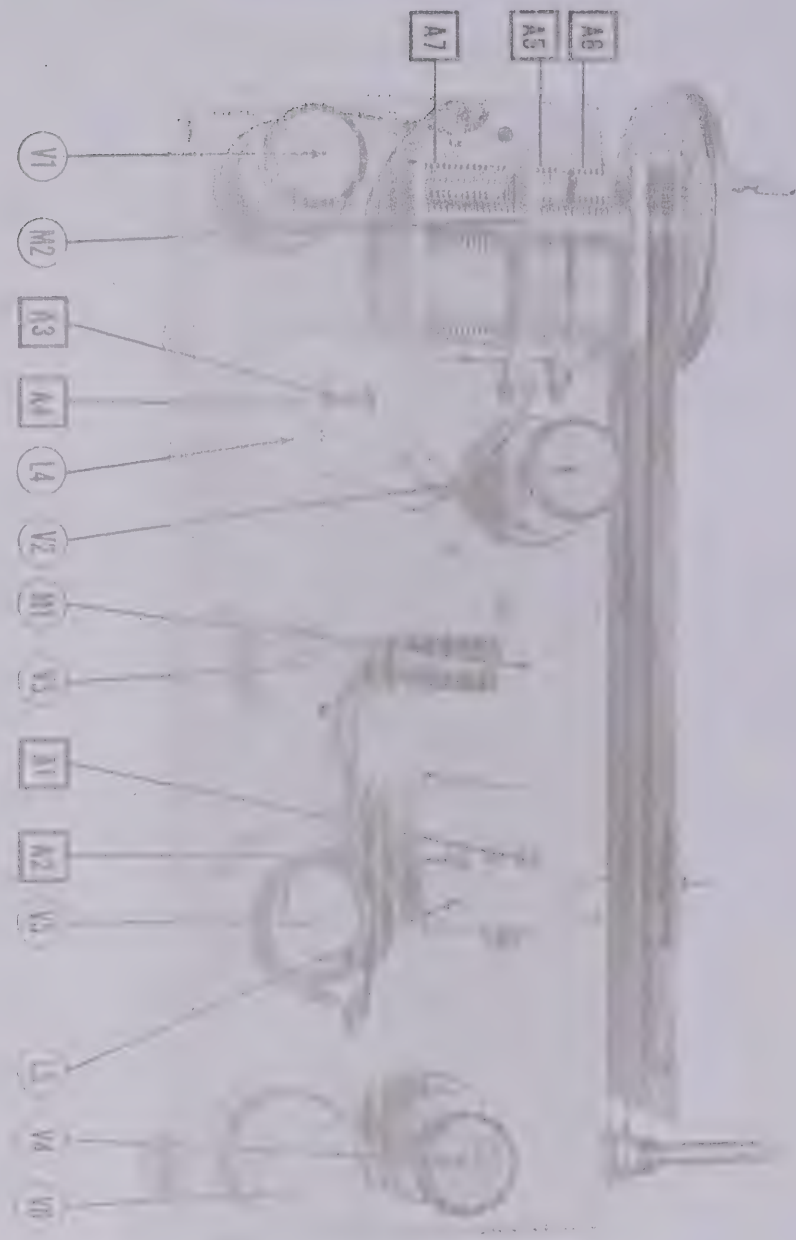
ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	OHMS	WATTS	G. E. PART No.	IRC PART No.	
R2	470	½			RF Amp. Cathode - See Note
R3	2200Ω	½	URD-057	BTS-2200	RF Amp. Decoup.
R4	22K	½	URD-081		Mixer Grid
R5	2.2Meg	½	URD-139	BTS-2.2Meg	AVC Network
R6	68Ω	½	URD-021		IF Amp. Cathode
R7	4.7Meg	½	URD-137	BTS-4.7Meg	AF Amp. Grid
R8	470KΩ	½	URD-113	BTS-470K	AF Amp. Plate
R9	1Meg	½	URD-121	BTS-1Meg	Output Grid
R10	150Ω	½	URD-025	BTS-150	Output Cathode
R11	1900Ω	2	URD-046	BTS-1900	Filter
R12	22Ω	½	URD-009		Range Limiter
R13	470KΩ	½	URD-113	BTS-470K	Isolator

Note: Some Models Use 1000 Ω Resistor In This Application

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	APPLICATION	REPLACEMENT DATA			INSTALLATION NOTES
		STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
T	2.5K Ω	A-3330	A-3031		

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA G. E. PART No.	VIKING PART No.	QUAM PART No.	INSTALLATION NOTES
	FIELD	V. C. IMP.				
SP1	PM	3.5Ω	ROP-020	46J6	46A1	
	CONE DIA.	V. C. DIA.				
SP2	4"X 6"	9/16"				

R F COILS

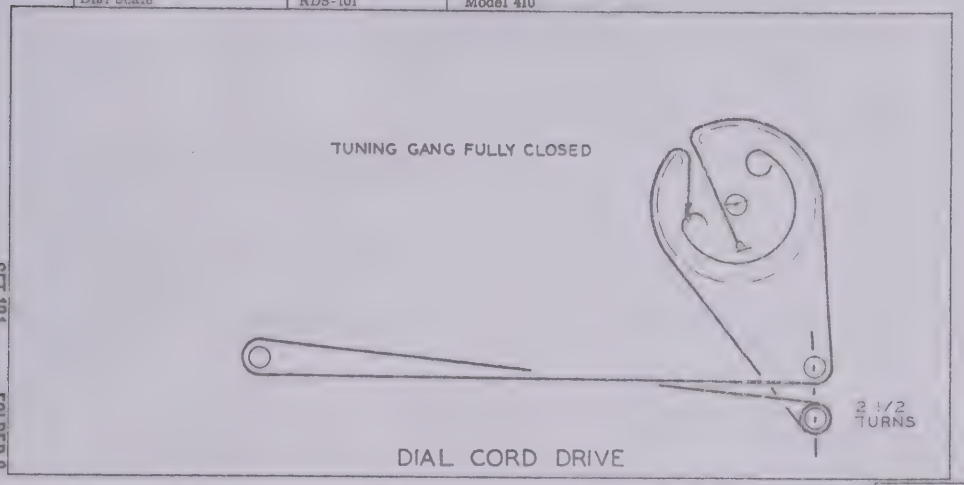
ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA G. E. PART No.	MEISSNER PART No.	
L1A	Loop Ant.	2.3Ω		RAB-143		Includes Cabinet Back Model 410
B	Loop Ant.			RAB-142		Includes Cabinet Back Models 404, 405
L2	RF Coil	70Ω	14Ω	RLI-125		
L3	Osc. Coil	.7Ω	7.8Ω	RLC-105	14-1073	
L4	1st IF	16Ω	16Ω	RTL-115	16-6666	
L5	2nd IF	22Ω	47KΩ	RTL-116		

DIAL LIGHTS

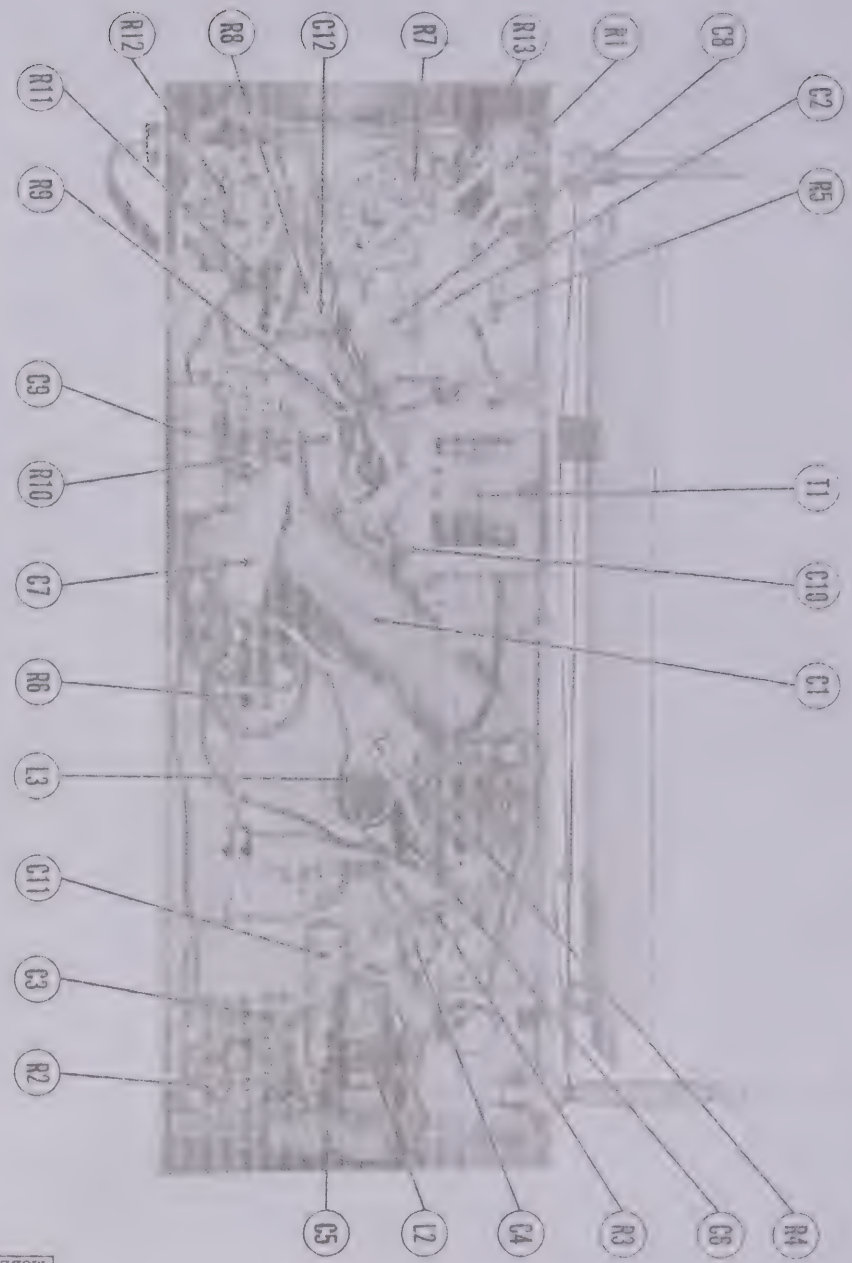
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA G. E. PART No.		NOTES
M2	Bayonet	6-8	.15	Brown			Type No. 47

MISCELLANEOUS

ITEM No.	PART NAME	G. E. PART No.	NOTES
M2	3 Gang Var. Cap	RCT-046	(25-467MMF, 13-225MMF, 19-154MMF)
	Cabinet	RAV-128	Model 410
	Cabinet	RAU-345	Model 404
	Cabinet	RAU-346	Model 405
	Knob	RDK-181	Model 404
	Knob	RDK-228	Model 410
	Knob	RDK-229	Model 405
	Dial Scale	RDS-100	Models 404, 405
	Dial Scale	RDS-101	Model 410

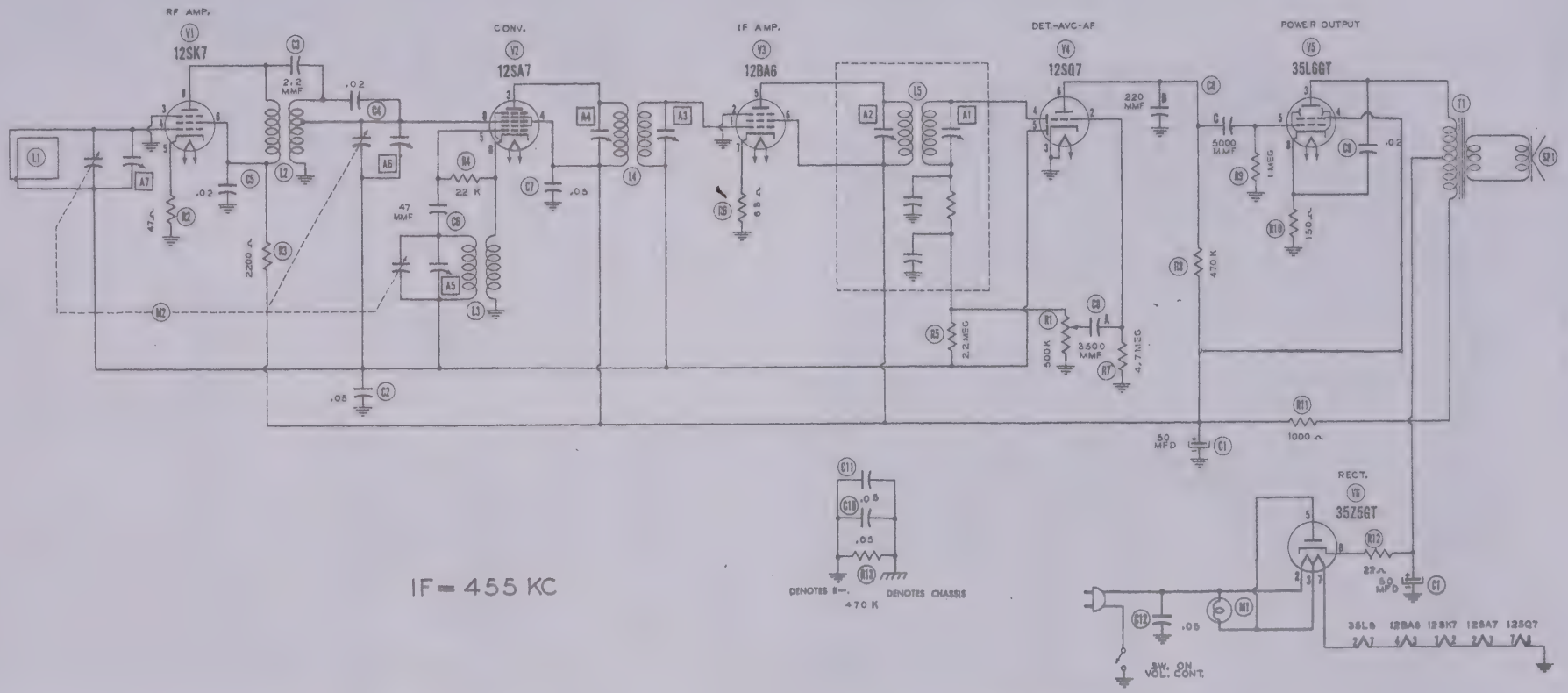


CHASSIS—BOTTOM VIEW



SET 121 FOLDER 6

GENERAL ELECTRIC 410 MODEL



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	12SK7	0V	25VAC	0V	-.7VDC	.5VDC	85VDC	36VAC	85VDC
V 2	12SA7	0V	24VAC	80VDC	80VDC	1-5.5VDC	0V	12VAC	0V
V 3	12BA6	-.7VDC	0V	36VAC	48VAC	80VDC	80VDC	.7VDC	
V 4	12SQ7	0V	-1VDC	0V	-.7VDC	-.7VDC	35VDC	12VAC	0V
V 5	35L6GT	0V	86VAC	100VDC	80VDC	0V	0V	46VAC	5.6VDC
V 6	35Z5GT	0V	117VAC	105VAC	101VDC	106VAC	103VDC	85VAC	.05VDC

§ TAKEN WITH VACUUM TUBE VOLTMETER

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	12SK7	470KΩ	25Ω	0Ω	2.7Meg	47Ω	†3.2KΩ	35Ω	†3.2KΩ
V 2	12SA7	470KΩ	25Ω	1KΩ	1KΩ	22KΩ	.7Ω	12Ω	8Ω
V 3	12BA6	2.7Meg	0Ω	35Ω	50Ω	1KΩ	1KΩ	68Ω	
V 4	12SQ7	470KΩ	4.7Meg	0Ω	550KΩ	2.7Meg	†470KΩ	12Ω	0Ω
V 5	35L6GT	Int.	65Ω	†170Ω	1KΩ	1Meg	0Ω	50Ω	150Ω
V 6	35Z5GT	Int.	115Ω	110Ω	†23Ω	110Ω	†27Ω	85Ω	30KΩ

† MEASURED FROM PIN 8 OF V6

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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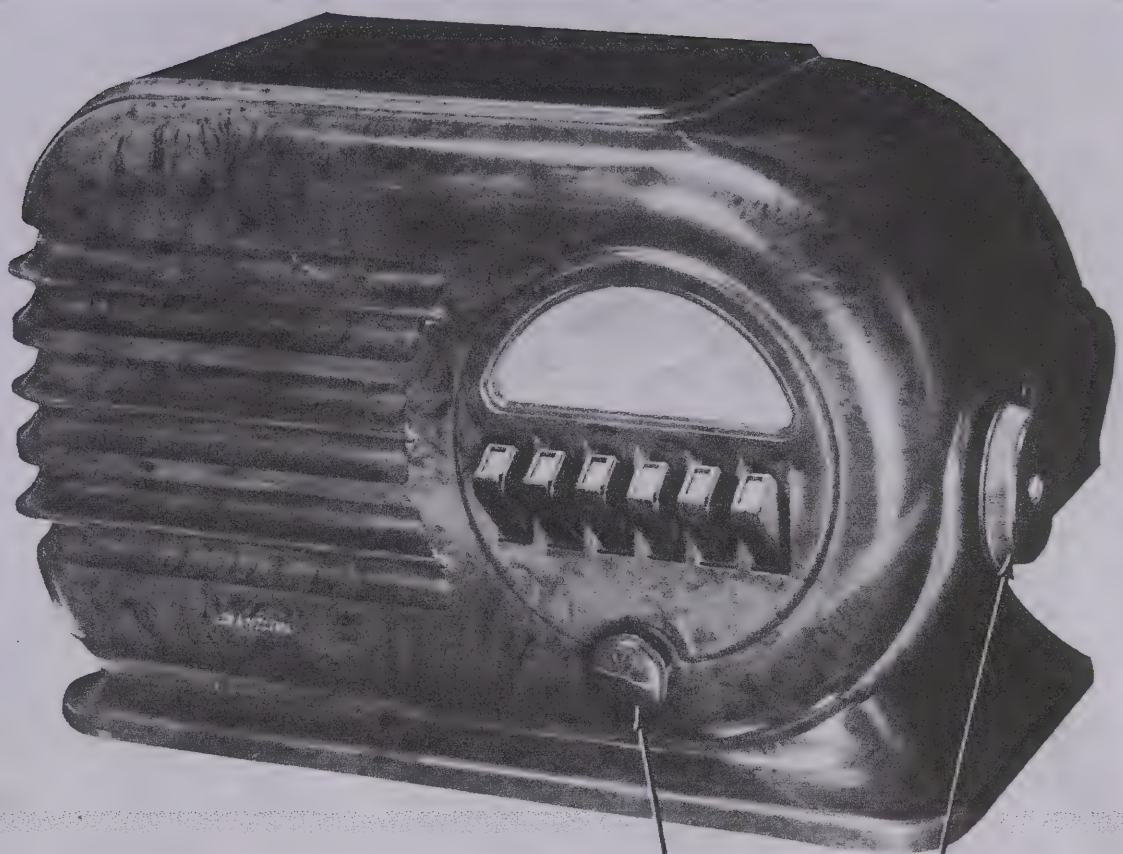
1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

GRANTLINE
MODELS 605, 606



GRANTLINE
MODELS 605, 606

GRANTLINE MODEL 605

TRADE NAME	Grantline, Model 605, 606
SUPPLIER	W. T. Grant Co.
TYPE SET	AC-DC Superhet. - Self Contained Loop Ant. - 6 Pushbutton Automatic Tuning
TUBES (SIX)	Types 12SK7GT RF Amp., 12SA7GT Converter, 12SK7GT IF Amp., 12SQ7GT Det.-AVC-1AF, 35L6GT Power Output, 35Z5GT Rectifier.
POWER SUPPLY	105-125 Volts AC-DC Rating .235 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	530-1650KC SHORT WAVE

ALIGNMENT INSTRUCTIONS

DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
.1 MFD	High side to pin #8 (signal grid) of 12SA7. Low side to B-.	455KC	Plates out of mesh. High freq. end of dial.	Across voice coil	A1, A2, A3, A4.	Adjust for maximum output. Use isolation transformer if available. If not, isolating capacitor must be connectdd between generator ground lead and receiver B-. Also decrease dummy ant. to .001 MFD to prevent excessive hum modulation.
"	"	1650KC	"	"	A5	"
200 MMFD	High side to ext. ant. clip. Low side to B-.	1400KC	Tune in 1400 KC signal.	"	A6	Adjust for maximum output.

Volume control at maximum volume and output from signal generator no higher than is necessary to obtain output reading. Use insulated alignment screwdriver for adjusting.

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	REPLACEMENT DATA: GRANTLINE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
1	RF Amp.	12SK7GT	12SK7GT	8N	
2	Converter	12SA7GT	12SA7GT	8AD	
3	IF Amp.	12SK7GT	12SK7GT	8N	
4	Det.-AVC-AF	12SQ7GT	12SQ7GT	8Q	
5	Power Output	35L6GT	35L6GT	7AC	
6	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: PART No.	MALLORY PART No.	SOLAR PART No.	SPRAGUE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
7(A)	40	150	11994	FP354	DY-3x20-150	EL-224	AF844D	UP4CJ1	■ Filter
(B)	20	150							▲ "
(C)	20	150							"
8	.1	400	C-8D-10760	TP428	S-4-1	TC-1	484-.1	DT4P1	Line Filter
9	.02	400	C-8D-10774	TP423	S-4-02	TC-12	484-.02	DT4S2	35L6 Plate Bypass
10	.004	600	C-8D-10788	TP407	S-6-004	TC-24	684-.004	DT6D4	Audio Coupling
11	.2	400	C-8D-10942	TP429	S-4-2	TC-2	484-.2	DT4P2	Line Isolating
12	.002	600	C-8D-10778	TP405	S-6-002	TC-22	684-.002	DT6D2	Audio Coupling
13	.05	200	C-8D-10770	TP426	S-4-05	TC-15	484-.05	DT4S5	AVC Filter
14	.25	200	C-8D-10775	TP430	S-4-25	TC-2	484-.25	DT4P25	RF Bypass Pwr. Supp.
15	.02	400	C-8D-10774	TP423	S-4-02	TC-12	484-.02	DT4S2	AVC Filter
16	.01	400	C-8D-10761	TP421	S-4-01	TC-11	484-.01	DT4S1	Ant. Series Tuned
17	100	500	C-8F3-6	MC235	MO.5-31	1FM-31	1468-.0001	5W5T1	Audio Plate Bypass
18	47	500	C-8F3-8	MC225	MO.5-45	1FM-45	1468-.00005	5W5Q5	RF Bypass Vol. Cont.
19	100	500	C-8F3-6	MC235	MO.5-31	1FM-31	1468-.0001	5W5T1	RF Bypass Diode
20	100	500	C-8F3-6	MC235	MO.5-31	1FM-31	1468-.0001	5W5T1	Osc. Grid Cond.
21	100	500	C-8F3-6	MC235	MO.5-31	1FM-31	1468-.0001	5W5T1	RF Coupling
22	120	500	C-8F6-114	MC236	MO.5-315	1FM-315	1468-.00015	5W5T15	Ant. Coupling

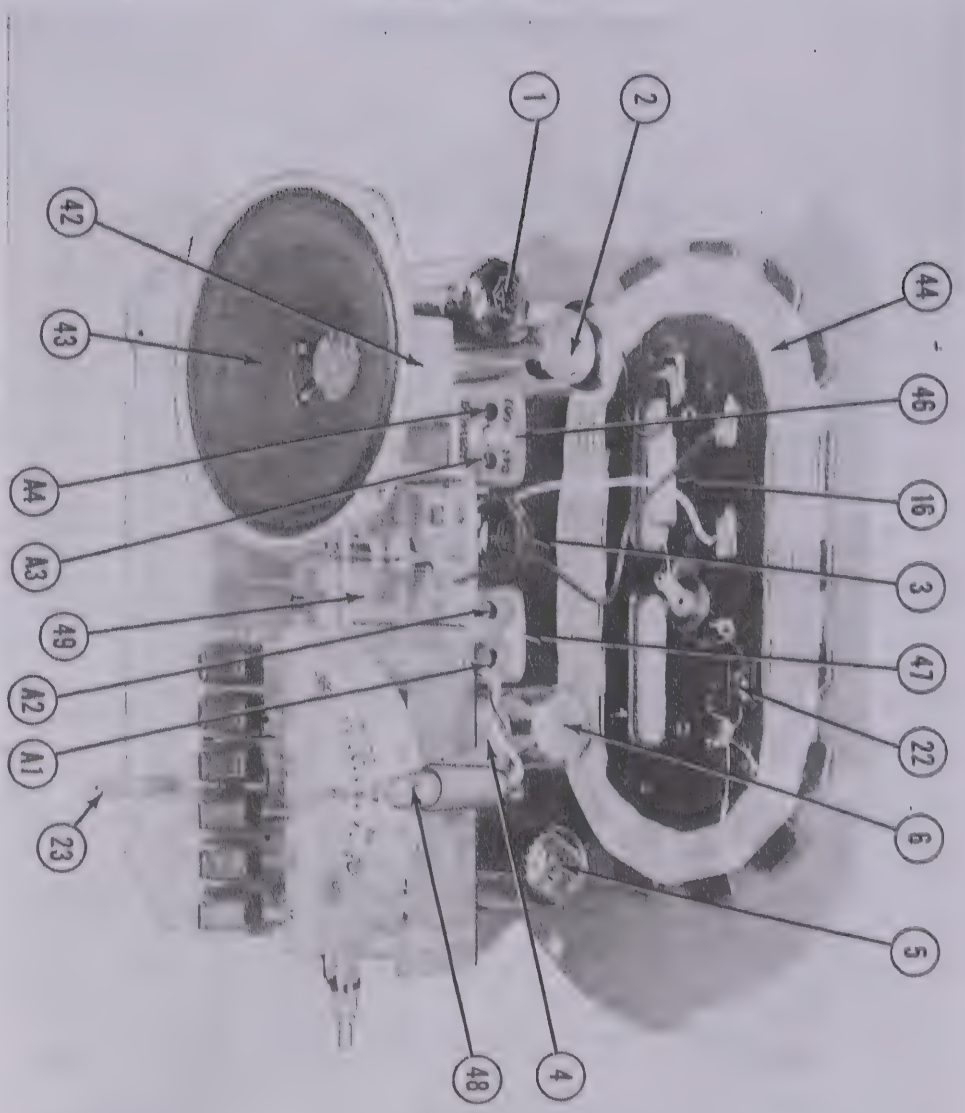
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: GRANTLINE PART No.	MALLORY PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
23(A)	1 Meg.	1	101193	MK402	D13-137	AM-63-Z	Volume Control
(B)	Shaft		Not Req.	Not Req.	E	KSD-3	Attach to 23A per instructions
(C)	Switch		" "	M26	41	SW-A	" " " " "

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: GRANTLINE PART No.	IRC PART No.	IDENTIFICATION CODES
24	150KΩ	½	C-9B1-26	BTS-150K	Br.-Grn.-Yl. AVC Network
25	100Ω	½	C-9B1-50	BW-½-100	Br.-Blk.-Br. RF Cathode
26	150KΩ	½	C-9B1-26	BTS-150K	Br.-Grn.-Yl. Line Isolating
27	5000Ω	½	C-9B1-70	BTS-4700	Grn.-Blk.-Red RF Plate Load
28	100KΩ	½	C-9B1-25	BTS-100K	Br.-Blk.-Yl. Converter Grid
29	47KΩ	½	C-9B1-22	BTS-47K	Yl.-Vi.-Or. Osc. Grid
30	22Ω	½	C-9B1-42	BW-½-22	Red-Red-Blk. Rectifier Ballast
31	220Ω	1	C-9B2-54	BW-1-220	Red-Blk.-Br. Filter
32	1200Ω	1	C-9B2-63	BW-1-1200	Br.-Red-Red "
33	150Ω	½	C-9B1-52	BW-½-150	Br.-Grn.-Br. IF Cathode
34	3.3 Meg.	½	C-9B1-34	BTS-3.3 Meg.	Or.-Or.-Grn. AVC Network
35	47KΩ	½	C-9B1-23	BTS-47K	Yl.-Vi.-Or. Diode Load
36	4.7 Meg.	½	C-9B1-35	BTS-4.7 Meg.	Yl.-Vi.-Grn. 1st AF Grid
37	220KΩ	½	C-9B1-27	BTS-220K	Red-Red-Yl. 1st AF Plate Load
38	150Ω	½	C-9B1-52	BW-½-150	Br.-Grn.-Br. Output Cathode
39	470KΩ	½	C-9B1-29	BTS-470K	Yl.-Vi.-Yl. Output Grid
40	33Ω	1	C-9B2-44	BW-1-33	Or.-Or.-Blk. Line Dropping

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS

TRANSFORMER (OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		GRANTLINE PART No.	STANCOR PART No.	THORDAR'N PART No.		
	PRI.	SEC.	PRI.	SEC.					
41	3500Ω	3.2Ω	310Ω	.6Ω	10595	A-3876	T-13842#		#Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			GRANTLINE PART No.	JENSEN PART No.		
42	FIELD PM	VC IMP. 3.2Ω	114191	ST-113†		†Improvise new mounting bracket.
43	CONE DIA. 4½"	VC DIA. ½"	NOT READILY REPLACEABLE-USE COMPLETE SPEAKER UNIT.			

R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA		INSTALLATION NOTES
		PRI.	SEC.	GRANTLINE PART No.	MEISSNER PART No.	
44	Loop Ant. Assy.	30Ω	.85Ω	B212-11062		Specify brown or ivory back
45	Osc. Coil	1Ω	2.8Ω	A-13D-10215		
46	Input IF	30.5Ω	3Ω	108140C	13-6658	
47	Output IF	23.5Ω	2Ω	108145C	13-6660	

DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					GRANTLINE PART No.		
48	Bayonet	6-8	0.15	Brown	107249		Type 47

MISCELLANEOUS

ITEM No.	PART NAME	GRANTLINE PART No.	NOTES
49	Tuning Cap.	B-8A-10211	2 Gang Variable with Trimmers A5,A6.
	Knob, Walnut	A-5B-11249-17	Volume
	" Ivory	A-5B-11249-8	"
	" Walnut	B-5B-10994-18	Tuning
	" Ivory	B-5B-10994-9	"
	Pushbutton	128292B-17	Walnut
	"	128292B-8	Ivory

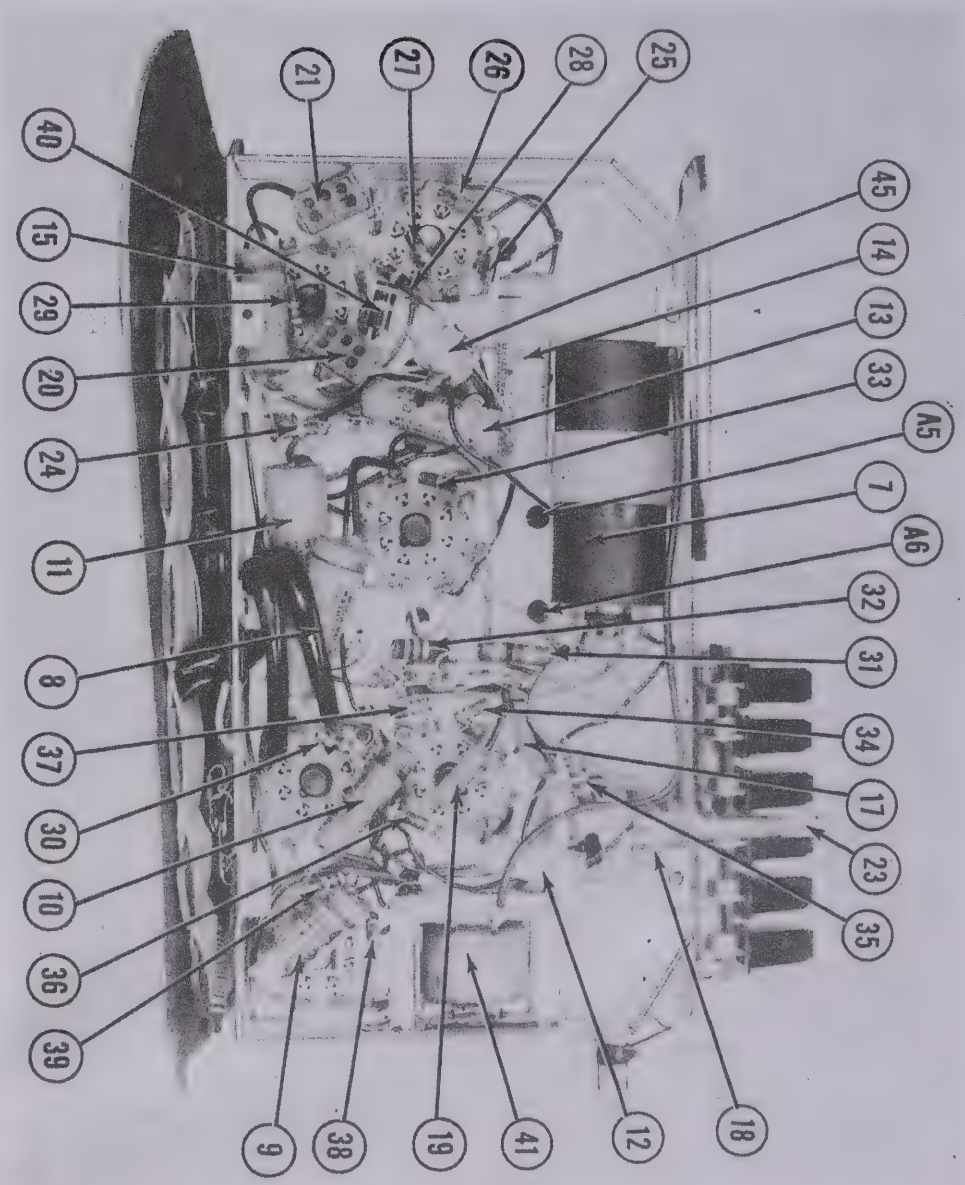
PUSHBUTTON ADJUSTMENTS

The pushbuttons may be used, after proper adjustment, for the automatic tuning of any six stations selected. They may be set up in any order.
1 - Turn on the radio and allow it time to warm up.
2 - From the call letter sheets supplied with radio press out call letters of six selected stations and insert them in any sequence in the rectangular opening in each pushbutton. Press in acetate tab into each pushbutton.
3 - Loosen locking screw in center of tuning knob by turning it counterclockwise.
4 - Press the first pushbutton down all the way. Hold it down firmly and turn the tuning knob to the station selected for that pushbutton. Tune the station in carefully and then release pushbutton.
5 - Follow the above procedure for each of the other five buttons, adjusting each to station selected.
6 - Rotate tuning knob as far clockwise as it will go. Tighten locking screw in center of tuning control knob very firmly.

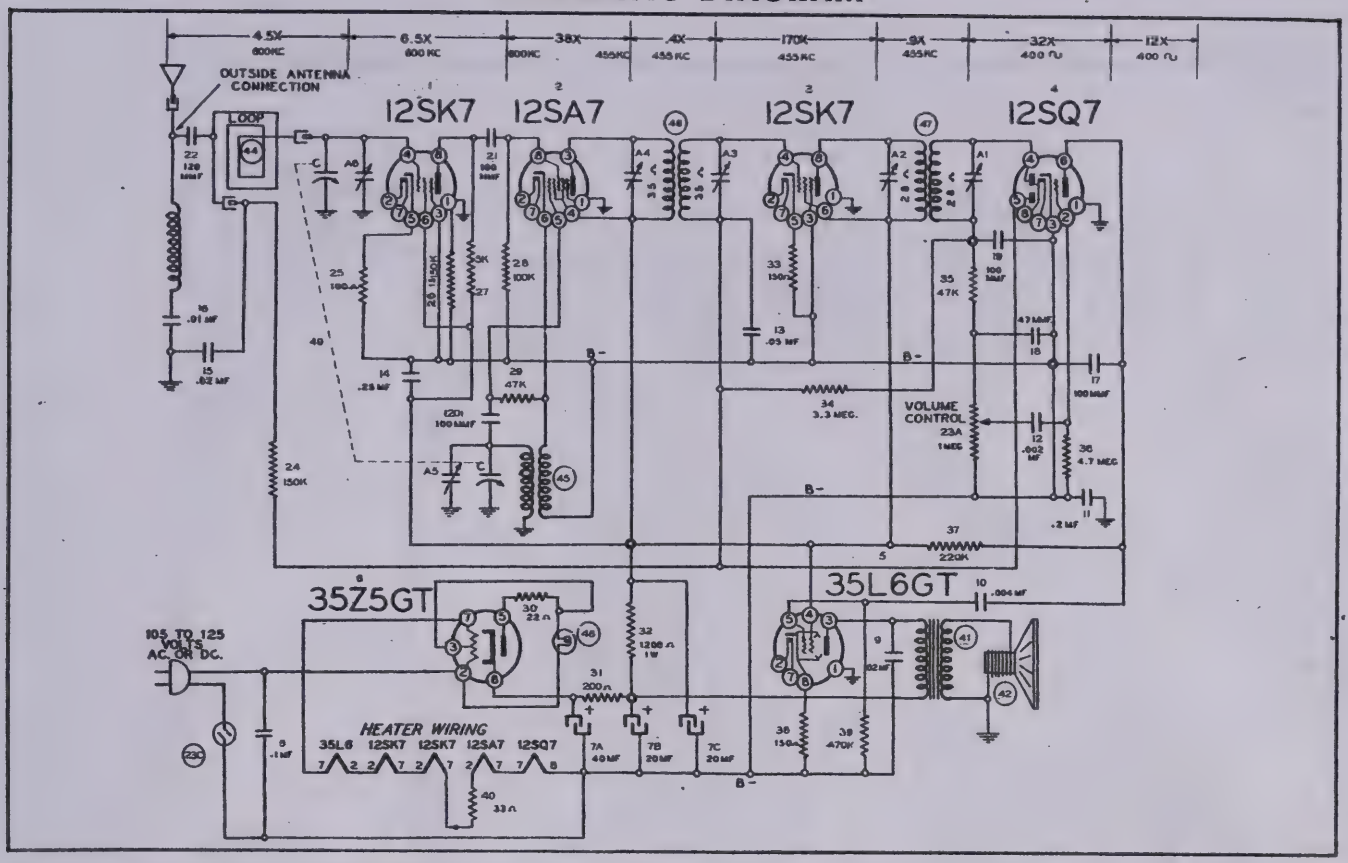
REPLACING DIAL POINTER DRIVE CORD

Six inches of cord are required. Numbers below correspond to circled numbers in diagram.
1 - Rotate tuning knob to extreme clockwise position.
2 - Tie cord to loop in spring as shown.
3 - Pass cord over idler pulley.
4 - Pass cord over pointer shaft; wind it one turn around shaft; pass it through key washer, then once more around shaft.
5 - Hook spring over end of dial support. Tie cord to spring. IMPORTANT: Full contraction of spring must rotate pointer shaft at least one half turn.
6 - Remove dial crystal by removing snap-in rivets.
7 - Make sure tuning knob is in extreme clockwise position. Then rotate pointer clockwise, against friction of shaft, until it is in a horizontal position, as shown.

CHASSIS—BOTTOM VIEW

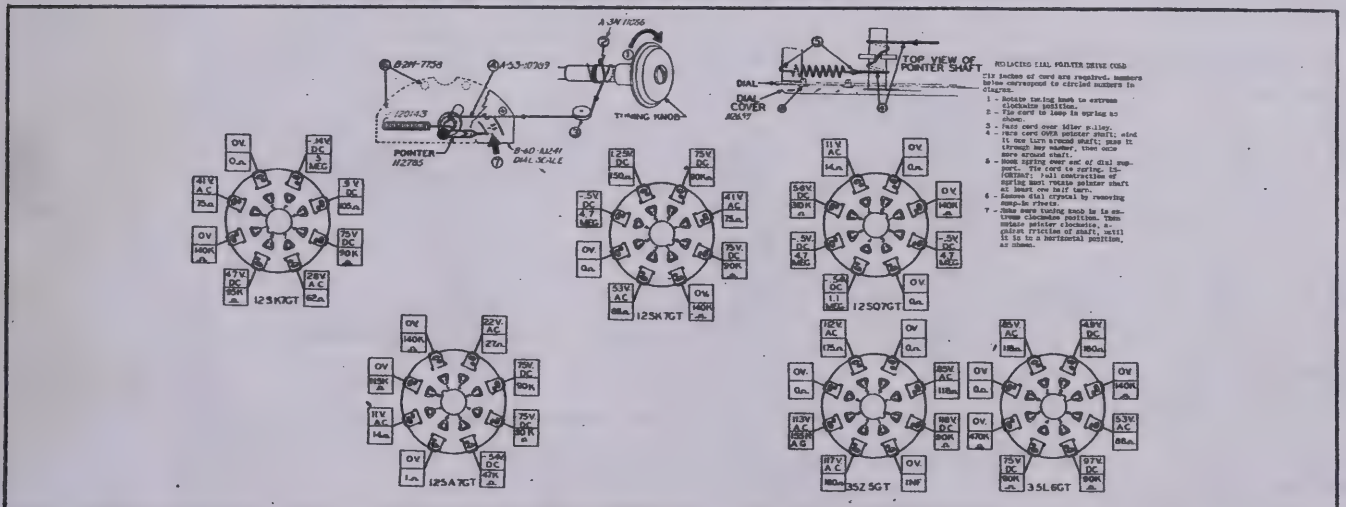


SCHEMATIC DIAGRAM



The stage gain measured values listed above are approximate values for average operative stages, rather than absolute values. It should be borne in mind that it is possible to introduce so many variables into the measurement operation, such as, type of equipment used for measuring, handling and placement of probes, the accuracy of alignment, etc., that an absolute reading is impractical. AVC is made inoperative and 3 volt battery bias substituted for measurement.

VOLTAGE AND RESISTANCE ANALYSIS CHART



1. DC voltage measurements are at 20,000 ohms per volt; AC voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

HOWARD W. SAMS & CO., INC.

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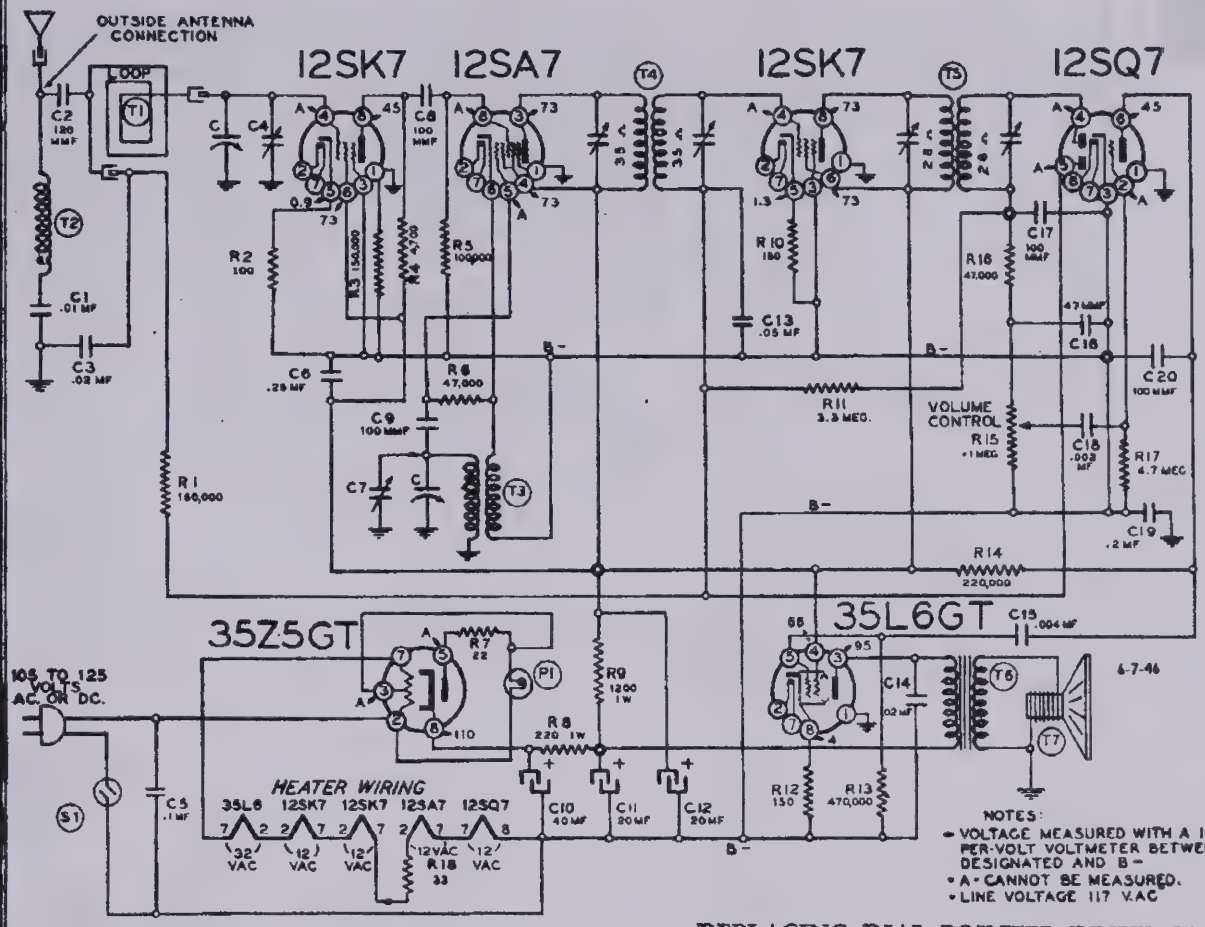
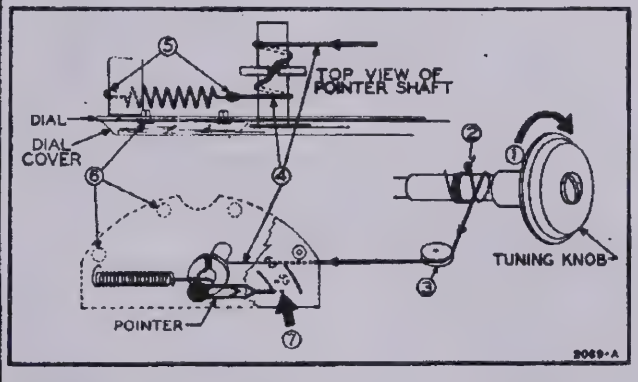




REPLACING DIAL POINTER DRIVE CORD

Six inches of cord are required. Numbers below corresp to circled numbers in diagram.

1. Rotate tuning knob to extreme clockwise position.
2. Tie cord to loop in spring as shown.
3. Pass cord over idler pulley.
4. Pass cord OVER pointer shaft; wind it one turn aro shaft; pass it through key washer, then once more aro shaft.
5. Hook spring over end of dial support. Tie cord to spr IMPORTANT: Full contraction of spring must rotate poi shaft at least one half turn.
6. Remove dial crystal by removing snap-in rivets.
7. Make sure tuning knob is in extreme clockwise posit Then rotate pointer clockwise, against friction of shaft, u it is in a horizontal position, as shown.

POWER SUPPLY.....105 to 125 volts, DC or 50-60 cycle AC, 35 watts. Also made for 25 cycles.

FREQUENCY RANGE.....530 to 1650 kc.

INTERMEDIATE FREQ....455 kc.

TUNING.....Two-gang capacitor.

ANTENNA.....Built-in loop. Also provisions for external antenna. No ground required.

SPEAKER.....5-inch; P.M.; voice coil impedance 3.2 ohms.

POWER OUTPUT.....1 watt undistorted. 1.5 watts maximum.

SENSITIVITY.....10 microvolts average 50-milliwatt output.

SELECTIVITY.....55 kc. broad at 1000 ti signal at 1000 kc.

TUBE COMPLEMENT.....12SK7, R. F. amplifier
12SA7, converter
12SK7, I. F. amplifier
12SQ7, 2nd detector, A
1st audio
35L6GT, output amplifie
35Z5GT, rectifier

MODELS 605,606
Series A

W. T. GRANT CO.

DIAL LIGHT—If the dial lamp burns out the set should not be operated until a new lamp has been installed. Failure to heed this caution may result in a burned-out 35Z5GT tube. To replace the lamp, first remove the four buttons which hold the back to the cabinet. On the inside of the back unclip the green, black, and white wires clipped to the back. The Chassis View illustration shows the location of the dial lamp. *Pull* the lamp bracket toward the rear of the radio. The lamp can now be removed and replaced. Use a 6- to 8-volt lamp, type T-47. When replacing the back on the cabinet, connect the green wire to the green-painted clip, the black wire to the black-painted clip, and the white wire to the unpainted clip.

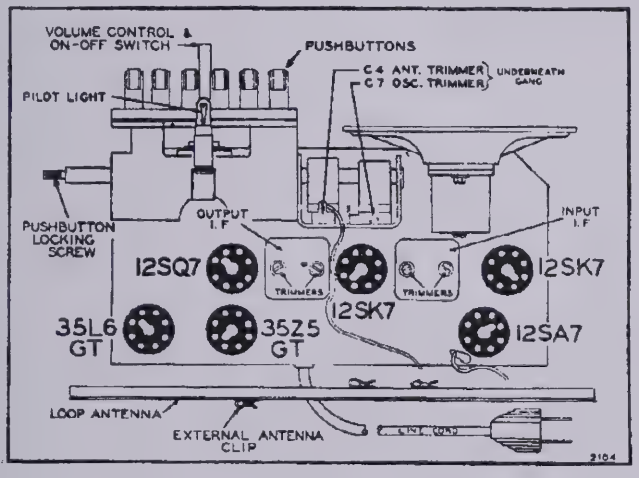
REMOVAL OF CHASSIS—If for any reason you wish to remove the radio chassis from the cabinet, proceed as follows: First be sure the line cord is disconnected from the house power receptacle. Then take off the back as described under "Dial Light" above. *Pull* the volume control knob off its shaft. Unscrew the locking screw in the center of the tuning knob and pull the knob off its shaft. Remove the four chassis mounting screws from the bottom of the cabinet. The chassis can now be slipped out.

After the chassis is replaced the automatic pushbuttons will probably have to be reset.

SETTING THE PUSHBUTTONS—The pushbuttons may be used, after proper adjustment, for the automatic tuning of any six stations on the standard broadcast band. They can be set up in any order.

1. Turn on the radio.

2. Push out the call letters of the six stations from the call-letter sheets supplied with this manual.



3. Insert one call-letter tab in the rectangular opening in the front of each pushbutton, in any order. Press an acetate tab (supplied in small envelope) into each of the pushbuttons.

4. With the screwdriver supplied, check to see that the locking screw in the center of the tuning knob (see front view) is loose. If it is not, turn it several turns to the left (counterclockwise).

5. Press the first pushbutton down *all the way*. With one hand hold the button down firmly and with the other carefully tune in the desired station. Release the pushbutton.

6. Follow this procedure for each of the five other buttons, setting each one for a different station.

7. Rotate the tuning knob on the side of the cabinet as far to the right as it will go. Tighten the locking screw in the center of the knob. IT IS IMPORTANT THAT THIS SCREW BE TIGHTENED VERY FIRMLY.

8. The pushbuttons are now properly set for automatic tuning.

Any of the six stations may be tuned in simply by pressing the proper button down as far as it will go. If you wish to reset any of the buttons for a new station, loosen the locking screw, set the pushbutton as described above, and re-tighten the locking screw.

ALIGNMENT PROCEDURE

(Refer to Chassis View for location of trimmers)

Output meter across 3.2-ohm output load.
Align for maximum output. Reduce input as needed to keep output near 0.4 volts.
Volume control at maximum for all adjustments.
Connect ground post of signal generator to B— of radio.

• Chassis must be removed from cabinet for proper alignment. Slight adjustments of the oscillator and antenna circuits can be made, without removing the chassis, through two holes provided on the bottom of the cabinet. The screws can be reached with a long screwdriver.

SIGNAL GENERATOR			*TUNER SETTING*	*ADJUST FOR MAXIMUM OUTPUT (in order shown)*
Frequency	*Dummy Antenna*	*Connection to Radio*		
455 kc	.1 mf	Grid (pin 8) of 12SA7	Plates out of mesh	Trimmers on output and input I.F. cans
1650 kc	.1 mf	Grid (pin 8) of 12SA7	Plates out of mesh	Oscillator trimmer C7 on bottom of gang
1400 kc	200 mmf	See note below	Set dial at 1400 kc	Antenna trimmer C4 on bottom of gang

Lay output lead of generator in back of loop antenna. Turn up generator output. Loop will pick up energy.

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©Tube Depot

Ref. No.	Part. No.	Description
		CAPACITORS*
C,C4,C7	B-8A-10211 ..	Two-gang, including antenna and oscillator trimmers
C1	C-8D-10761	.01 mf, 400 volts, 20%
C2	C-8F3-114	120 mmf, 500 volts, 10%, mica
C3,C14	C-8D-10774	.02 mf, 400 volts, 20%
C5	C-8D-10760	.1 mf, 400 volts, +20%—10%
C6	C-8D-10775	.25 mf, 200 volts, +20%—10%
C8,C9 C17,C20	C-8F3-8	100 mmf, 500 volts, 20%, mica
C10,C11, C12	11994 or	Electrolytic for 60 cycles; 40 mf, 20 mf, 20 mf x 150 volts
	11995	Electrolytic for 25 cycles; 60 mf, 40 mf, 40 mf x 150 volts
C13	C-8D-10770	.05 mf, 200 volts, 20%
C15	C-8D-10788	.004 mf, 600 volts, 20%
C16	C-8F3-6	47 mmf, 500 volts, 20%, mica
C18	C-8D-10778	.002 mf, 600 volts, +40%—15%
C19	C-8D-10942	.2 mf, 400 volts, +30%—10%
		RESISTORS*
R1,R3	C-9B1-26	150,000 ohms, ½ watt, 20%
R2	C-9B1-50	100 ohms, ½ watt, 10%
R4	C-9B1-70	4700 ohms, ½ watt, 10%
R5	C-9B1-25	100,000 ohms, ½ watt, 20%
R6	C-9B1-82	47,000 ohms, ½ watt, 10%
R7	C-9B1-42	22 ohms, ½ watt, 10%
R8	C-9B2-54	220 ohms, 1 watt, 10%
R9	C-9B2-63	1200 ohms, 1 watt, 10%
R10,R12	C-9B1-52	150 ohms, ½ watt, 10%
R11	C-9B1-34	3.3 megohms, ½ watt, 20%
R13	C-9B1-29	470,000 ohms, ½ watt, 20%
R14	C-9B1-27	220,000 ohms, ½ watt, 20%
R15,S1	101193	Volume control (1 megohm) and on-off switch
R16	C-9B1-23	47,000 ohms, ½ watt, 20%
R17	C-9B1-35	4.7 megohms, ½ watt, 20%
R18	C-9B2-44	33 ohms, 1 watt, 10%
		COILS AND TRANSFORMERS
T1,T2	B-212-11062	Loop antenna assembly, including capacitors C1 and C2, coil T2, and cardboard back. Specify brown or ivory back.
T3	A-13D-10215	Oscillator coil
T4	108140G	Input I.F. coil complete in can. Range of trimmers: 56-104 mmf
T5	108145C	Output I.F. coil complete in can. Range of trimmers: 56-104 mmf
T6	10595B	Output transformer

*The values of the resistors and mica capacitors listed above are based on RMA standards. Due to conditions beyond our control, some receivers have been shipped with components of pre-standardized values. This receiver will operate equally well with components of either group. An illustration of the differences follows:

Pre-standardized value—200,000 ohms, 20%, 1/3 watt
RMA value—220,000 ohms, 20%, 1/2 watt
Pre-standardized value—50 mmf, 500 volts, 20%
RMA value—47 mmf, 500 volts, 20%

NOTE ON TUBE REPLACEMENT

Replace a defective metal 12SK7 tube with another metal tube. Replace a glass 12SK7 tube with a metal tube or with an exact duplicate of the tube now in the set.

Ref. No.	Part. No.	Description
		TUNER MECHANICAL PARTS
	115146	Cams (6 used on cam shaft)
	115143	Key washers (12 used)
	117528	Spacer (1 used on shaft)
	117602	Spacer (4 used on shaft)
	117604	Locking collar
	131181	Spring washer for collar
	A-3N-11086	Spacer on shaft for drive cord
	A-49A-11087	Spring on shaft for drive cord
	115361	Cam lever with roller
	120283	Return spring for lever
	112785	Pointer
	A-53A-10989	Drive cord (6 inches)
	120143	Tension spring for drive cord
	B-6D-10241	Dial scale
	112659	Crystal for dial scale
	B-2M-7758	Snap-in rivets (4) for crystal
		MISCELLANEOUS
T7	114191B	Speaker, 5-inch, P.M.
	121171	Socket for tube (6 used)
	10798D	Line cord and plug
P1	107249	Dial lamp, 6-8 volts, T-47
	107271	Socket assembly for dial lamp
	A-2H-11271	Tube shield for bakelite-base 12SA7GT
	A-2H-10715	Tube shield for metal-base 12SA7GT
	128334B-18	Cabinet, walnut
	128334B-9	Cabinet, ivory
	A-5B-11249-17	Knob, volume, walnut
	A-5B-11249-8	Knob, volume, ivory
	B-5B-10994-18	Knob, tuning, walnut
	B-5B-10994-9	Knob, tuning, ivory
	120388	Locking spring for tuning knob
	A-3F-10995	Locking screw in tuning knob
	128292B-17	Pushbutton, walnut
	128292B-8	Pushbutton, ivory
	134123	Rubber bumper for bottom of cabinet
	131193	Snap-in rivets (4) for mounting back
	112784	Station call letters, 1 set
	112606	Acetate tabs for call letters

Courtesy Nostalgia Air

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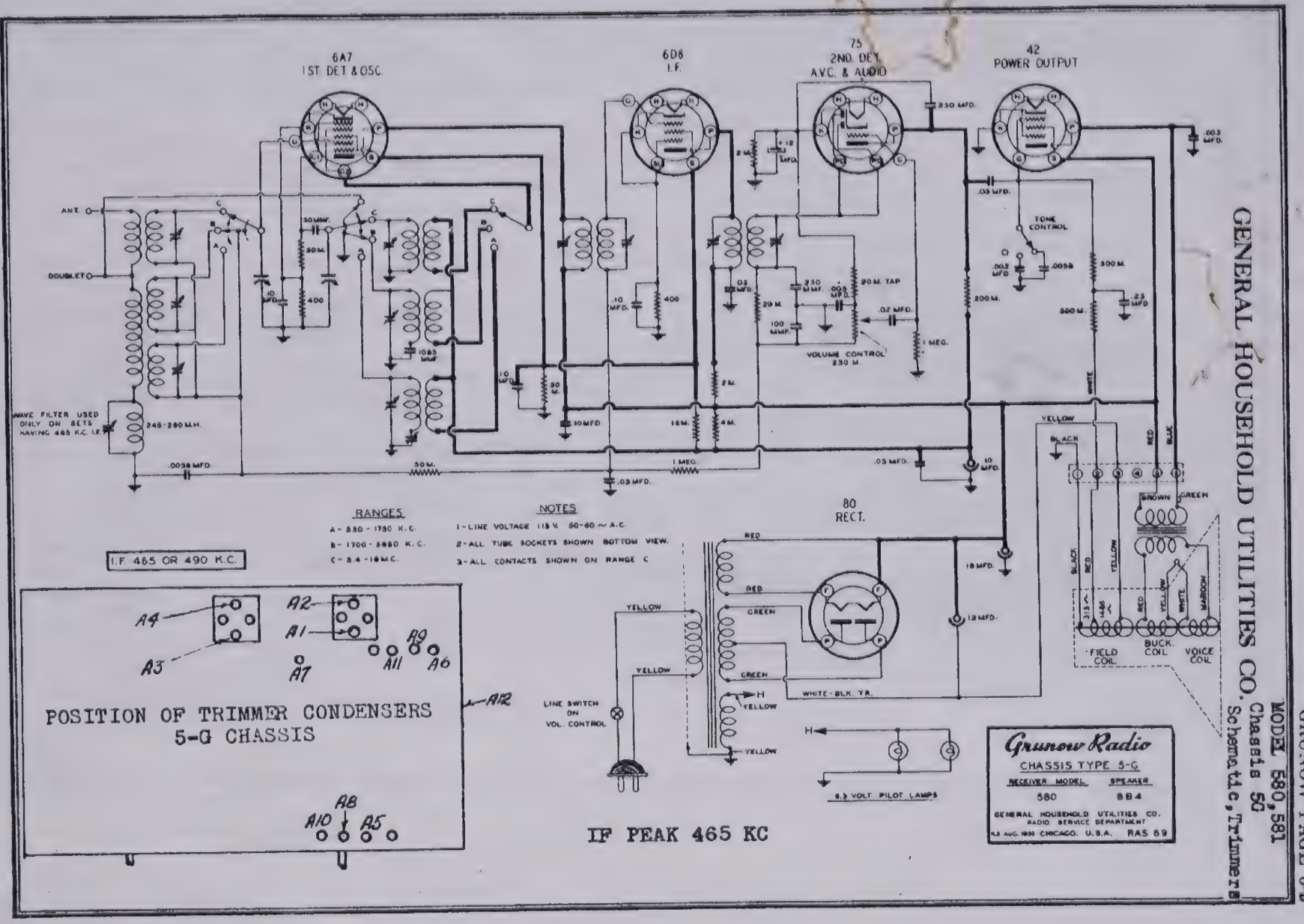
GENERAL HOUSEHOLD UTILITIES CO.

MODEL 580, 581
Chassis 5G
Schematic, Trimmers



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SERVICE INSTRUCTIONS GRUNOW CHASSIS 5 G
BROADCAST and SHORT WAVE RECEIVER
MODELS 580 - 581
SPEAKERS 8B4 - 8B4

The frequency range is divided into three bands or divisions, one covering the band of 550 to 1750 K.C. (A), one the band from 1700 to 5680 K.C. (B), and the other from 5.4 to 18 megacycles (C).

CIRCUIT ALIGNMENT PROCEDURE

Do not attempt to align the 5 G Chassis without proper equipment. Alignment condensers are shown in the accompanying illustrations, - I.F. Condensers on top of the I.F. Transformers.

1 - EQUIPMENT:

(A) Test Oscillator

A modulated Oscillator capable of producing signals at the I.F., Broadcast and Short-Wave frequencies is necessary for alignment of the 5 G Chassis.

(B) Insulated Screw Driver - (all bakelite or fibre) about 6" long.

(C) Output Meter.

This may be any of the standard Output Meters, but should be sufficiently sensitive to provide a good deflection at low signal strength.

(D) Coupling Means.

Coupling Condensers of 200 mmf., .25 mfd., and a 400 Ohm resistor should be used when coupling oscillators to receiver during alignment as specified in the procedure.

(E) The Receiver should be aligned in a location free from local interference (interference caused by motors - flashers - automobile ignition, etc.) as high frequency disturbances will cause difficulties when the short wave section is being adjusted. (A screen room is to be recommended.

2 - DIAL SETTING:

Turn dial knob until condensers are fully meshed. The dial pointer (Hour hand) should be on the horizontal line of the dial, pointing to 9 and 3 O'clock. The minute hand should be at 12 O'clock or in a vertical position.

3 - I. F. ALIGNMENT:

Connect signal lead of test oscillator to grid of 6A7 (1st detector tube) through .25 mfd., condenser. Connect the ground lead to the Chassis.

(A) Set Dial pointer to 1400 K.C. and range switch on position "A".

(B) Place test Oscillator in operation at 490 K.C. or 465 K.C. (see note below.) Turn receiver volume control and tone control to maximum.

(C) Attenuate test Oscillator output to lowest value, consistent with obtaining a readable indication on output meter.

(D) Adjust four I.F. Trimmers, A1, A2, A3, A4, located on the I.F. Transformers on top of Chassis. Fig. (1), until maximum output is obtained. During alignment, maintain as low a value of signal as will allow obtaining of accurate adjustment.

4 - 1400 K. C. ALIGNMENT:

(A) Connect signal lead of test oscillator through 200 mmf., condenser to antenna binding post.

(B) Connect the test oscillator ground lead to the ground post of Chassis.

(C) Place test oscillator in operation at 1400 K.C.

(D) Turn dial pointer to 1400 K.C.

(E) Turn range switch to range "A".

(F) Adjust broadcast oscillator trimmer A5, Fig. (1), to maximum output.

(G) Adjust 1st Det. Trimmer (A6), Fig. (1), to maximum output.

5 - 600 K.C. ALIGNMENT:

(A) Place test oscillator in operation at 600 K.C.

(B) Tune in signal to maximum (this point does not have to be exactly at 600 K.C. dial setting).

(C) Adjust the 600 K.C. Padding Condenser (A7), Fig. (1), (which is on top of Chassis to the rear of variable condenser) in direction of signal increases. At same time rock the tuning condenser back and forth through resonance while adjusting padding condenser until maximum output is obtained.

6 - RECHECK 1400 K.C. ALIGNMENT

7 - 5 M. C. ALIGNMENT:

(A) Set Range switch at "B".

(B) Place test Oscillators in operation at 5 M.C.

(C) Turn Dial Pointer to 5 M.C.

(D) Adjust Set Oscillator Trimmer (A8), Fig. (1), to maximum output.

(E) Adjust Detector Trimmer (A9) Fig. (1) to maximum output.

(F) Check Dial Setting at 1800 K.C.

8 - 18 M.C. ALIGNMENT:

(A) Connect signal lead of test oscillator through 400 Ohm resistor to Antenna binding post of Chassis.

(B) Connect the ground lead to ground terminal of chassis.

(C) Set Range Switch to range "C" and turn dial pointer to 18 M.C.

(D) Place Test Oscillator in operation at 18 M.C.

(E) Adjust set Oscillator Trimmers (A10), Fig. (1), to maximum output.

(F) Adjust Detector Trimmers (A11), Fig. (1), to maximum output.

(G) On the 18 M.C. Alignment it will be noted that there are two settings at which the signal will be received. Use the lower of the images for alignment point, that is, the setting giving most capacity or the point at which the trimmer screw is farthest in. Check dial setting at 6 M.C.

NOTE:-

Due to interference caused by commercial code stations in some locations, it has been necessary to use two I.F. Frequencies on this Receiver, one of 490 K.C. where code interference is in the neighborhood of 455 K.C. and the other where the interfering stations are operating in the 500 K.C. band, we use an I.F. of 465 K.C.

The I. F. Frequencies of the Receiver is stamped on the rear of the Chassis, and if there is any doubt as to I.F., peaking, it is only necessary to apply a variable I.F., signal to the I.F.Amplifier, and maximum output will indicate resonance or frequency at which the I.F.'s were peaked.

To further overcome this form of interference, sets peaked at 465, also incorporate a wave filter in the Antenna circuit. This filter should be tuned to the same frequency as the I.F. Transformers. Tuning is accomplished after the set has been completely aligned by applying the I.F. Frequency signal through to a .0002 Mfd., condenser to the Antenna binding post of the Receiver, and tuning the wave filter condenser, (A12) (located on the right hand side of the Chassis) so that the incoming signal is at minimum output.

In other words, apply a strong 465 K.C. signal to the Receiver Antenna Post thru the .0002 Mfd., Condenser, and tune wave filter so that the output meter indicates minimum.

Courtesy Nostalgia Air

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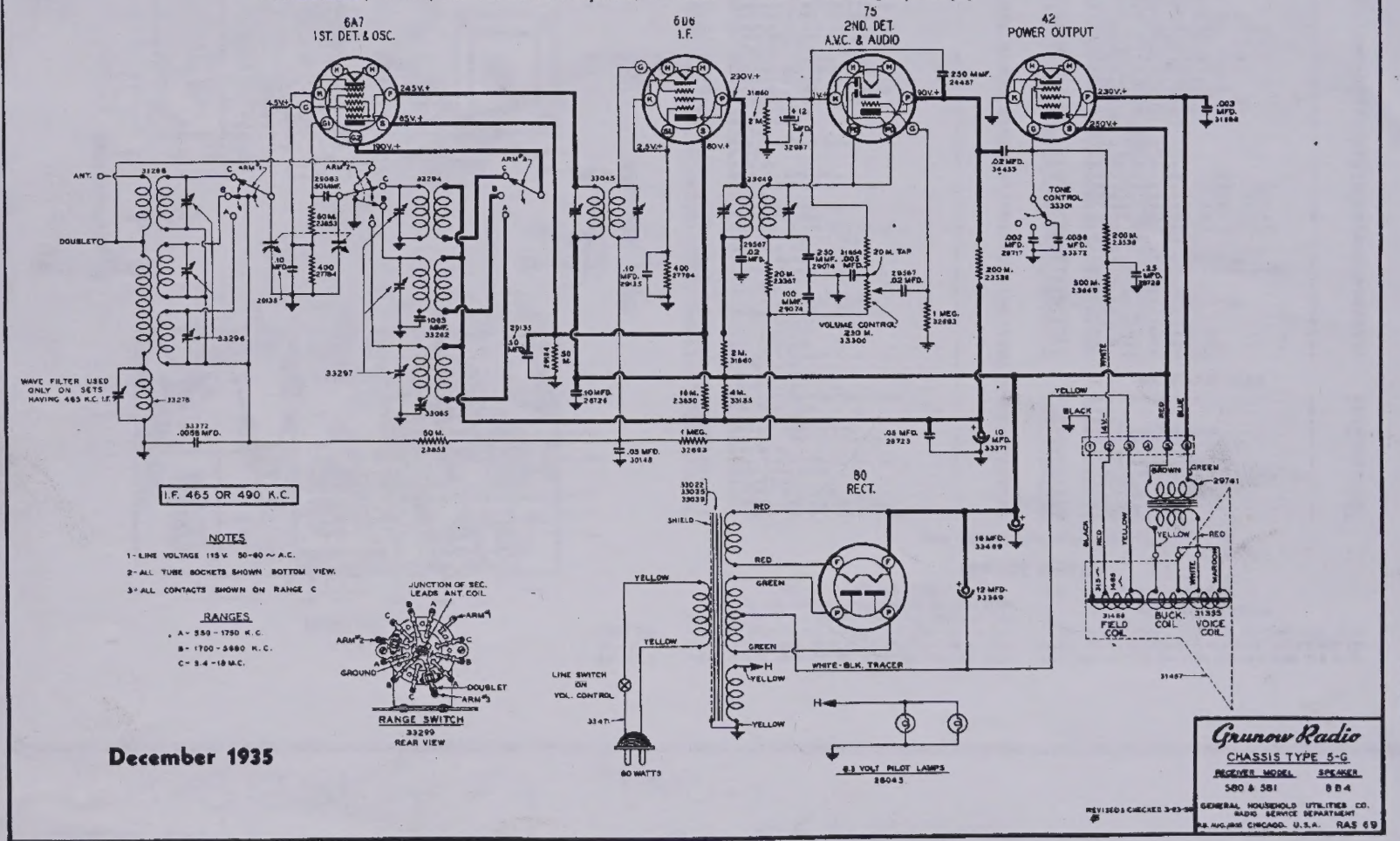
GENERAL HOUSEHOLD UTILITIES CO.

MODELS 580,581
Chassis 5G,Revised
Schematic,Voltage
Notes

The GRUNOW 5G Chassis is a Five tube, 115 V-50-60 cycle A.C., three band receiver with A.V.C., Tone Control and a "Band Spread" dial. The tubes used are: 6A7 1st Detector and Oscillator, 6D6 I.F. Amplifier, 75 2nd Detector, A.V.C., and 1st Audio Amplifier, 42 Power Output tube and an 80 Rectifier tube.

The frequency range is divided into three bands or divisions, one covering the band of 550 to 1750 K.C. (A), one the band from 1700 to 5680 K.C. (B), and the other from 5.4 to 18 megacycles (C)



NOTES

1- LINE VOLTAGE 115 V. 50-60 ~ A.C.
2- ALL TUBE SOCKETS SHOWN BOTTOM VIEW.
3- ALL CONTACTS SHOWN ON RANGE C

RANGES

A- 550 - 1750 K.C.
B- 1700 - 5680 K.C.
C- 5.4 - 18 M.C.

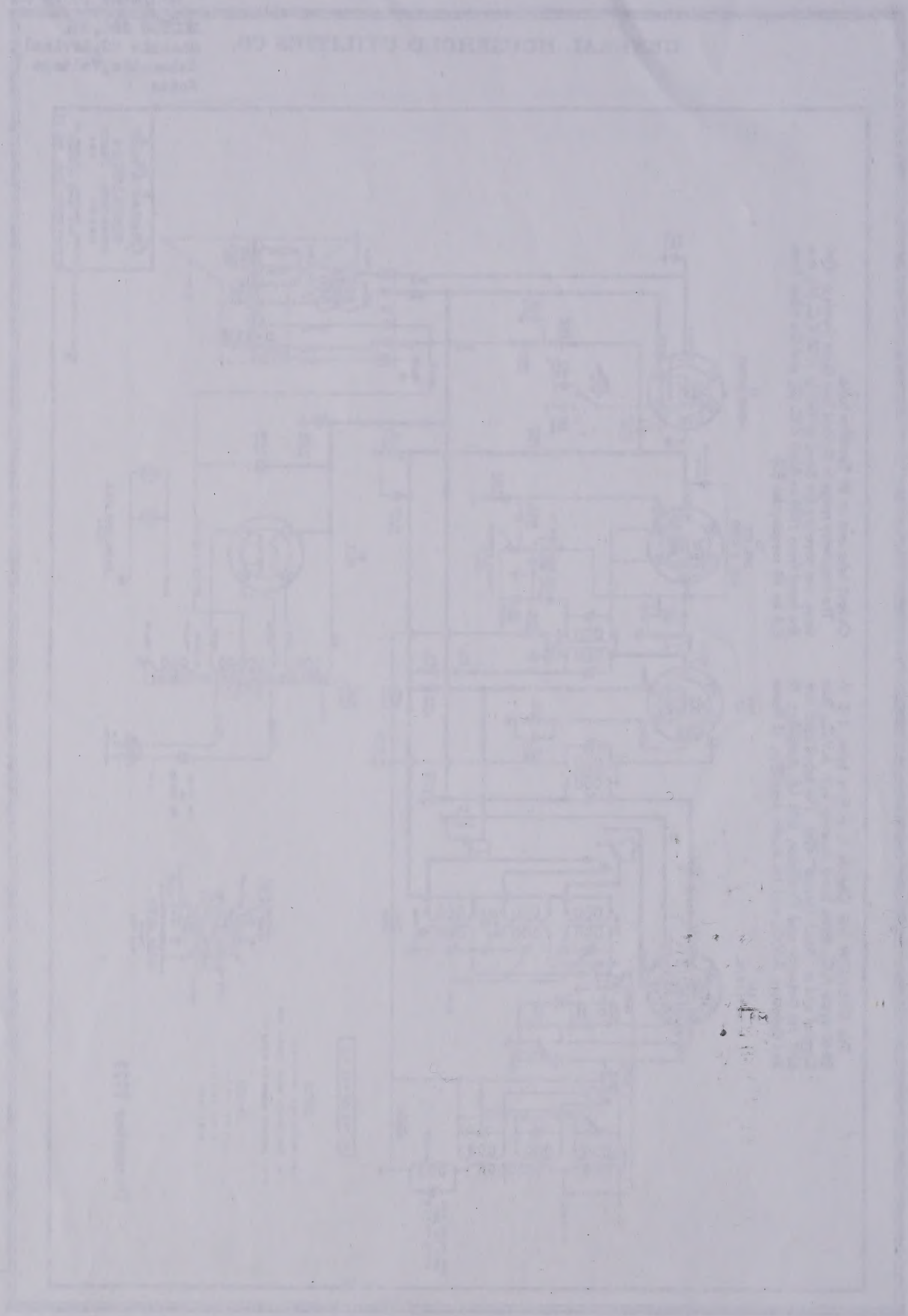
December 1935

Grunow Radio
CHASSIS TYPE 5-G

RECEIVER MODEL	SPEAKER
580 & 581	884

GENERAL HOUSEHOLD UTILITIES CO. RADIO SERVICE DEPARTMENT 42 AVE. CHICAGO. U.S.A. RAS 69

REVISED & CHECKED 3-23-36



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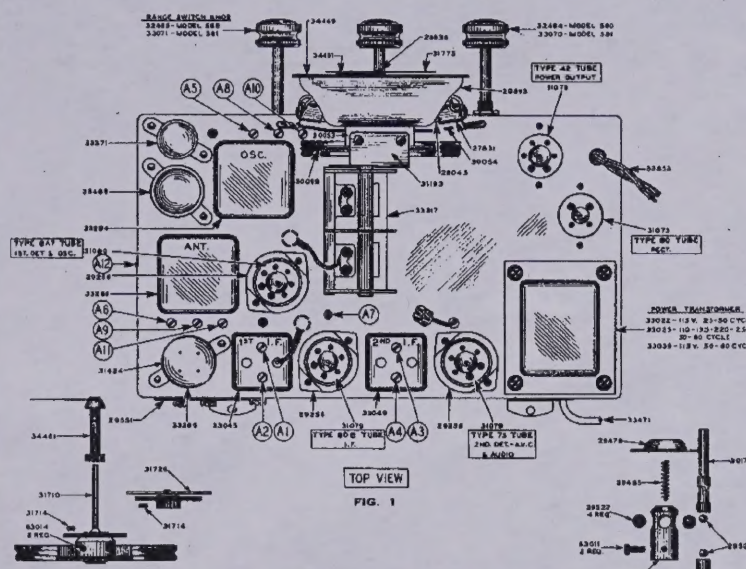

FIG. 1

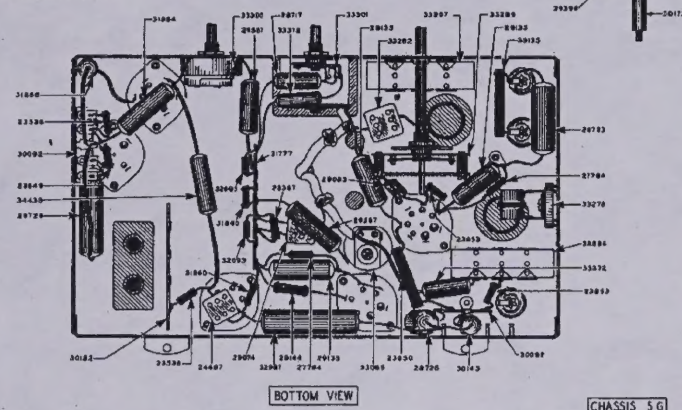

FIG. 2

CHASSIS 5G
OCT. 1935
RAS 95

PARTS AND PRICE LIST

MODELS 580—581
CHASSIS 5G—5GX—5GZ

Part No.	Description	No. Used	Price
20962	Grid Cap	3	$ .01
23367	20 M Ohms ¼ Watt Resistor	1	.20
23538	Resistor 200 M Ohm ¼ Watt	2	.15
23849	Resistor 500 M Ohm ¼ Watt	1	.15
23850	Resistor 16 M Ohm 1 Watt	1	.20
23853	Resistor 50 M Ohm ¼ Watt	2	.15
24487	250 MMF Condenser	1	.20
27422	Insulating Washer	1	.02
27784	Resistor 400 Ohm ¼ Watt	2	.15
27831	Pilot Light Socket	2	.10
28045	Pilot Lamp	2	.15
28638	Pointer Screw	1	.02
28717	Condenser .002 Mfd. 700 V Tubular	1	.25
28723	Condenser .05 Mfd. 400 V Tubular	1	.30
28726	Condenser .1 Mfd. 400 Tubular	1	.30
28728	Condenser .25 Mfd. 200 V Tubular	1	.35
28793	Junction Box Connection Assem. 580Z-581Z Only	1	1.00
29065	Electrolytic Condenser Strap	2	.03
29074	Dual Condenser 100-250 Mmf.	1	.30
29083	Condenser 50 Mmf.	1	.20
29135	Condenser .1 Mfd. 200 V Tubular	3	.25
29164	Resistor 50 M Ohm ½ Watt	1	.15
29256	Tube Shield Base	3	.05
29396	Drive Sleeve	1	.35
29476	Ball Race	1	.10
29485	Drive Shaft Thrust Spring	1	.05
29521	3/16 Ball	2	.02
29522	11/32 Ball	4	.02
29524	Spring for Drive String	1	.10
29551	Antenna Binding Post Assembly	1	.10
29552	Window	1	.15
29553	Window Retaining Ring	1	.10
29554	Cabinet Escutcheon	1	.60
29567	Condenser .02 Mfd. 400 V Tubular	2	.25
29612	Escutcheon Retaining Ring	1	.20
29832	Tube Shield Body	3	.15
29893	Reflector Riveted Assembly	1	.50
30053	Reflector Mounting Bracket	1	.15
30054	Dial Light Bracket	1	.10
30092	Terminal Board	2	.10
30099	Drive String & Eyelet Assembly	1	.10
30143	Condenser .05 Mfd. 200 V Tubular	1	.25
30152	Terminal Board (4 Lug)	1	.10
30172	Outer Drive Shaft	1	.35
30173	Inner Drive Shaft	1	.10
30182	Coil Shield & Eyebolt Assem.	2	.25
31075	4-Prong Socket	1	.10
31079	6-Prong Socket	3	.15
31080	7-Prong Socket	1	.15
31193	Drive Shaft Mounting Bracket Assem.	1	.30
31215	Tube Shield Cap	3	.10
31360	Window Gasket	1	.05
31424	Condenser Insulating Shield	1	.10
31710	Drive Drum, Hub and Gear Assem.	1	1.10
31714	Gear Spring	2	.05
31726	Pinion, Gear & Adjusting Plate Assem.	1	.55
31775	Pointer (Hour Hand)	1	.10
31777	Terminal Board	1	.10
31860	Resistor 2 M ¼ Watt	2	.15
31864	Condenser .005 Mfd. 700 V Tubular	1	.25
31868	Condenser .003 Mfd. 700 V Tubular	1	.25
32464	Knob (For Model 580)	3	.20
32465	Knob (For Model 580 Range Switch)	1	.20
32693	Resistor 1 Meg. 1/3 Watt	2	.15
32858	Mounting Foot Assem.	4	.25
32865	Electrolytic Condenser Strap	1	.04
32987	12 Mfd. 25 V Dry Electrolytic Cond.	1	.75
33022	Power Transf. 25-50 Cycle, 115 V	1	7.00
33025	Power Transf. 110-115-220-250 V. 50-60 Cycle	1	7.00
33039	Power Transf. 50-60 Cycle, 115 V	1	5.00
33045	1st I.F. Coil & Shield Assem.	1	1.75
33049	2nd I.F. Coil & Shield Assem.	1	1.35
33065	Oscillator Padder Condenser	1	.40
33070	Knob for Model 581	3	.20
33071	Knob for Model 581 (Range Switch)	1	.20
33082	Transformer Mounting Spacer	4	.03
33135	Resistor 4 M Ohm 1 Watt	1	.20
33262	Condenser 1065 Mmf.	1	.20
33278	Wave Filter & Condenser Assem.	1	.80
33288	Antenna Coil & Shield Assem.	1	1.65
33292	Shield & Eyebolt Assem.	2	.35
33294	Oscillator Coil & Shield Assem.	1	1.70
33296	Trimmer Assem. (Ant.)	1	.40
33297	Trimmer Assem. (Osc.)	1	.40
33298	Spacer for Trimmers	4	.04
33299	Range Switch	1	1.35
33300	Volume Control	1	1.05
33301	Tone control switch	1	.45
33317	Variable Condenser	1	3.00
33367	Decalcomania—Range Letters	1	.10
33368	Electrolytic Condenser Cathode Terminal	1	.02
33369	Electrolytic Condenser 12 Mfd. 450 V.	1	1.20
33371	Electrolytic Condenser 10 Mfd. 250 V.	1	.85
33372	Condenser .0058 Mfd. 700 V. Tubular	2	.25
33469	18 Mfd.—300 V. Wet Electrolytic Cond.	1	.90
33471	Attach. Cord	1	.40
33853	Speaker Cable	1	.55
34435	Condenser .02 Mfd. 400V Tubular	1	.25
34436	Condenser .05 Mfd. 400 V Tubular (Audio)	1	.35
34449	Dial Chart	1	.50
34461	Pointer & Pinion Assem.	1	.40
61207	1" x 8-32 Screw (Chassis Mtg.)	4	.01
63011	Set Screw (Drive Sleeve)	2	.02
63014	5/16 x 10-32 Set Screw	2	.02
63838	Felt Washer for Model 581	4	.01
63839	Felt Washer for Model 580	4	.01
63863	Flat Washer (Chassis Mtg.)	4	.01

8B4 SPEAKER PARTS

28844	Yoke & Pole Piece Assem.	1	1.20
28849	Spacer	2	.02
29038	Gasket	1	.10
29041	Basket & Front Plate Assem.	1	1.00
29047	Terminal Strip Assem.	1	.10
29051	Terminal Strip Cover	1	.10
29052	Terminal Strip Cover Insul.	1	.05
29741	Output Transformer	1	1.75
29769	Clamp Ring	1	.05
31355	Cone & Voice Coil Assem.	1	1.00
31467	8B4 Speaker Complete	1	10.00
31468	Field Coil Assem.	1	3.00

Prices subject to change without notice.

SERVICE DATA

CONTINUITY AND VOLTAGE

Continuity and voltage readings should be taken from the underside of the chassis. The values given on the schematic diagram are average and allow the service man to make a quick check of the chassis constants. The socket layouts given on the schematic diagram show each socket from the underside.

THE RANGE SWITCH

The Range switch is a simple four pole triple throw switch with its contacts in a convenient position over the coil forms allowing operation with very short wire leads.

VFKS 0081 $6 20g Andrews
Foil 661-257-7700
Modern Ec

test speaker plug